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TRANSACTIONS

OF THE

AGRICULTURAL AND HORTICULTURAL SOCIETY OF INDIA.

VOL. II.

PRINTED, PARTLY AT THE HURKARU PRESS, HARE STREET, CALCUTTA; AND PARTLY AT THE SERAMPORE PRESS.

1836.

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INTRODUCTION.

In presenting to the public the first of the numbers in which, to ensure the advantages of early publication, it is proposed, in future, to print the transactions of the Agricultural and Horticultural Society of India, it has been deemed expedient to preface them by a concise report of the progress of the Society, since the publication of the first volume of its proceedings.

These appeared, at the end of 1828; but as the volume had been chiefly prepared and printed in 1827, it becomes necessary to go back to the month of May in that year.

At that period it was the opinion of a majority of the Society, that the success of its exertions in Horticulture must be very limited, unless aided by the establishment of an extensive garden, in which the plants acquired might be placed, their peculiarities remarked, and the requisite experiments carried on under the superintendance of its officers. These considerations induced the Society to apply for a piece of ground, rent-free; and Government, with much liberality, gave it permission to occupy Mr. Palmer's garden, at Allipore, at a rent of Rupees 100 per month, and also, of such further quantity of ground adjoining, as could be procured for Rupees 30 more.

In consequence of this permission, an extraordinary Meeting of the Society was held, on the 7th day of May, 1827, when the Secretary submitted a statement detailing the objects to be pursued in the proposed garden,

and the mode of management to be adopted; which being approved of, was directed to be engrossed as the regulations for the garden*.

A Committee of management was also appointed, consisting of the office bearers of the Society and three other Members, who were to be elected annually. At the same Meeting the treasurers submitted their accounts, and there appeared at the credit of the Society the sum of Rupees 9,650, exclusive of Rupees 2,000, recently remitted to England, for the purchase of grafted fruit trees and garden seeds.

The garden was taken possession of during the same month, and by degrees its management so entirely engrossed the attention of all the office bearers of the Society, that no public or general meetings of its Members were called between the months of February and December, 1828; and it being generally understood, that the regulations of the Society, as respected the funds to be expended on the garden, had not been attended to by the Committee, it was moved, at a general meeting, on the 3d of December, 1828, "That the Com-
" mittee do, in accordance with the regulations passed
" on the 7th May, 1827, report to the Society, at a meet-
" ing to be called on the 14th January, thereafter, what
" had been effected in the garden; what further was
" proposed to be done; what sums had been expended
" on it; and under what sanction."

A Meeting was held accordingly, but no report having been presented, it was again moved and agreed to, " That a committee be appointed to enquire into the " state of the Society, and to report thereon." On the 19th of April, 1829, the Committee submitted their report†, which, after stating that the funds of the Society had been exhausted without sanction or benefit, re-

* Appendix No. I. † Appendix No. II.

commended, that the constitution of the Society itself should be improved, by an annual election of its office bearers, and greater publicity given to its proceedings. The report was adopted, and the Meeting proceeded to the election of officers for the following year, when the Honorable Sir Edward Ryan was chosen President, and Dr. Carey, N. Alexander, Esq. Baboo Radacanth Deb, and afterwards, His Highness The Nawab Saulat Jung, Vice President; C. K. Robison, Esq. Secretary, and Baboo Ramcomul Sen, native Secretary and Collector.

Committees of Agriculture, Horticulture, and of Papers were named; the Poosah garden * was abandoned, and the expenses of that at Allipore were brought more within the means of the Society. The immediate consequences of these changes were, that a great many new Members joined the Society, and a public interest was taken in its proceedings which previously unknown.

It was thought at this epoch by many, that the attention of the Society had been hitherto too much confined to the introduction of what, with reference to the climate of Lower Bengal, and the residence of the majority of the Subscribers, might be termed exotics: they conceived, that the efforts and the funds of an Indian Agricultural Society might be far better applied, and more in consonance with the original draft of proposals for its formation, published in Vol. I. than they had hitherto been;---in a word, that the Sugar, Cotton, Coffee, Silk, and other great staples of commerce, were far more legitimate objects of its special encouragement, deriving, as it did, and hoped still more to do, its chief support from the Commercial and Agricultural community, than the introduction, at a heavy expense, of European fruit

* See vol. I. of the Transactions.

trees, with other pursuits of the same nature, which, however landable in themselves, few have the leisure to attend to, or feel the want of, whilst all are interested in seeing our commercial resources augmented, by improvements in our Agriculture.

In November, 1829, it was intimated to the Society *, through Mr. Molony, Deputy Secretary in the General Department, that Government were desirous of co-operating with it to promote the production of articles of raw produce of an improved description for importation; it being understood, that it was not the intention of Government to interfere, in any manner, with the proceedings of the Society.

In reply to this communication†, the Society, not feeling itself at liberty to dissert on the generally depressed state of the agricultural population of India, though it felt well convinced, that here, as in every country, agricultural and commercial prosperity must ever depend on the well-being of the people, confined itself therefore, necessarily, to recommending the more immediate means of improvement by the distribution of seeds, plants, useful information, and premiums, as probably, the best means of stimulating improvements in our staple articles; they requested, that the sum of 20,000 Rs. might be placed at their disposal for this purpose, and that a further annual sum might be allowed for the purpose of enabling them to distribute smaller premiums.

In reply to this letter, the 20,000 Rs. for premiums were accorded by Government, for whose information the proposed terms‡ on which they were to be awarded, were submitted before publication; and, in further aid of the Society's efforts, they were authorised to establish an experimental farm, for which

* Appendix No. III. † Appendix No. IV. ‡ Appendix No. V.

the annual sum of 10,000 Rs. exclusive of rent, was allowed, and 4,500 for buildings and stock, for the first year. The sentiments of the Society, for such liberal encourgement, will be found expressed in their letter acknowledging these donations *.

After much pains had been taken to select a proper spot, which it was not found possible to procure sufficiently near to Calcutta without many difficulties, a tract of about 500 Bigas, at Acra, was engaged from Mr. Myers, as agent for Mr. Tyler, and a committee named to superintend the details of the farm.

In June, 1830, the Society had the pleasure of seeing a branch Society established at Dinapore, near Patna; and the letter of Captain Sage, its Secretary, announcing this, and expressing the desire of its members to be considered as members also of the Calcutta Society, will be found in Appendix, No. VII.

Considerable quantities of Upland Georgia, Sea Island, and Demarara, cotton seed, with some Virginia and Maryland tobacco seeds, together with a saw gin, for cleaning cotton, which had been sent out by the Honorable the Court of Directors, were placed, about this time, at the disposal of the Society, by Government†, and some interesting papers also, on the cultivation of these articles, received from the same source, will be found printed in the Transactions‡.

A quantity of cotton seed, from Tenasserim, was also sent by Government to the Society for distribution; but the cotton which has been produced from it seems to be but little, if at all, superior to the common sorts known in India. The first consignment of American cotton seed was most extensively distributed, but nearly failed every where, either from arriving at an

* Appendix No. VI. † Appendix No. VIII. ‡ Appendix No. IX.

unseasonable epoch, or from the seed itself having heated in the packages, it having remained more than 2 months, (during the rains,) in a low, damp, godown, of the Import Ware House, and at Cooley Bazar, before it was sent to the Society. Another consignment, which reached Calcutta, in 1831, was partially distributed, and seems to have succeeded better, but it is yet premature to speak of it in terms of certainty.

In July, 1830, the Garden Committee presented their first Report, which, as detailing most fully the progress of that branch of the Society's objects is reprinted in Appendix No. IX. and an additional Report from them, on the subject of European fruit trees, in Appendix No. X. The whole will be found to detail, in terms which are far from being exaggerated, the very favorable progress of the Society towards the attainment of one of its great objects, the amelioration of our table vegetables; of that of fruits it is yet too early to speak. In the Appendix No. XI. will be found a further Report from a committee, appointed 9th March, 1831, to revise the system hitherto pursued in the annual distribution of prizes to the native gardeners; the recommendations in which were adopted by the Society for its future guidance.

In November of the same year, the Society had the gratification of learning from their President, the Honorable Sir Edward Ryan, on his return from the newly established Sanatarium at Chirra Poonjee, that many European, and country vegetables, and fruits, principally introduced from their garden, and by the exertions of its members, were flourishing and would, in all probability, be permanently successful there; As leading to the consideration that, in such an extensive and beautiful, as well as healthy tract of country, a numerous population might one day find, that, through the efforts of the Society, productions so necessary to their wants, their comforts, or their luxuries, were

already provided, this Report, which will be found in Appendix No. XII. was received with much interest.

This brief detail of the Society's progress now closes: It will be resumed in a future volume and brought down to a later epoch; and, in closing it for the present, it is not without a feeling of satisfaction, that we look back upon what has been accomplished and what is now in progress; more especially, when it is recollected, that this has been done, and is doing, in a country where all are so fully occupied in the pursuit of fortune, or in securing the means of living, that none have leisure, and few even means, to devote to the pursuit of purely scientific, or generally useful objects.

Every European in India considers himself as only abroad for a time, looking when his chase is over, to return to a distant home; and how delusive soever this anticipation may appear, when philosophically considered, still, from habit, and from being frequently renewed by daily occurring impressions, it is clung to with a tenacity which, it is to be feared, renders it too often the bane of any great or continued exertion towards the permanent benefit of the country; or it has, when discarded, left that utter weariness of, and apathy to all beyond the mere routine of business which is not less adverse to pursuits from which, in general, no immediate benefit is derived.—In a word, we have few or none of that numerous class at home to whom public exertion and public pursuits are alike a want and an amusement; and we have fewer still who can discard from their minds, the erroneous feeling, that all exertion of this nature is, in the main, for another, and a separate class with whom they have but little in common.

With these deadening checks on the little portion of energy which every man in this climate has to spare for public objects, and with the obstacles which the

peculiarities of Indian Society and pursuits necessarily present, it would be unfair to estimate the progress of an Indian Agricultural Society by that of institutions of the same nature in other countries, where these impediments of distance, of difference of customs, and of laws, deeply and fatally inimical to the prosperity of agricultural pursuits, do not exist; still, however, much that the Society has proposed to itself has been attained, and much more is in progress. In a future report it is proposed to enter into farther details.

APPENDIX.

I.

Regulations for the Garden of the Agricultural and Horticultural Society.

It had long been evident, that the success of the exertions of the Agricultural and Horticultural Society must be very limited, unless aided by the establishment of a Garden, in which the plants acquired might be placed, their peculiarities remarked, and the requisite experiments carried on under the immediate superintendance of its officers. These considerations induced the Society to apply for a piece of ground, rent-free, and Government has, with much liberality, given permission to take a lease, in perpetuity, of Mr. Palmer's Garden at Allipore, at Rs. 100 per month; and also, of such further quantity of ground adjoining, as can be procured for Rs. 30 more. The Society, therefore, considers, that the period is arrived when the establishment of a Garden may be attempted. They, in consequence, are completing the arrangements for a tract of ground in addition to Mr. Palmer's Garden, the particulars of which, together with the intended plans of the establishment for the Garden, and the objects to which it is to be applied, are herein detailed, in order to be communicated to all the Members of the Society, and such others as take an interest in Horticulture.

2.—The site of the Garden is at Allypore, at the commencement of the Budge Budge Road; the extent is 30 beegahs, exclusive of the Ground to be still acquired, and which may be estimated at as many more; the tenure, the situation, the easy supply of water, and every circumstance connected with the land, is such as to render this acquisition particularly well suited for the purposes for which it is designed.

3.—Of the various objects of cultivation, the first, and that which requires the most attention and investigation, is fruits. Of these the most approved and useful varieties will be planted and exhibited according to the different modes of cultivation belonging to each class; but the selection hereby implied, will be the result of actual experience in the qualities and habits of every variety, growing either in India, in Great Britain, or in the gardens of foreign countries. New fruits will also be introduced, and these, as well as the kinds hitherto known, will be subjected to various modes of treatment, in order to ascertain whether these can be acclimated, and that by which they can be made most effectually useful and productive. The immediate consequence of cultivating many sorts together, will be a clear and unequivocal determination of the denominations of our Native Fruits, and the establishment of an authentic nomenclature in future.

4.—Esculent vegetables will receive no less attention than fruits. New kinds will be sought after, and brought into comparison with those already in use, and the whole will be subjected to such a course of in-

vestigation and experiment, as will be the means of ascertaining the best varieties of each species, as well as the most advantageous modes of culture. The observer will thus be enabled, by actual inspection, to know the kinds best suited to his purposes.

5.—Such is the general outline of the plan of cultivation intended; but in connection with it, experiments of every nature appertaining to Horticulture, whether to verify former results, or to try new practices proposed or suggested, will be undertaken, and carried on with attention.

6.—The whole of the proceedings above alluded to, will be carefully noted, and every matter or occurrence in the Garden will be recorded, so that reference may at all times be made thereto; the results of those experiments and observations will, from time to time, be laid before the Society at its Meetings, in order that such as shall be deserving of publication may be printed in the Transactions.

7.—A head gardener, to be procured from England, will be a permanent servant of the Society; but the under native gardeners and labourers employed, will be young men, who having acquired some previous knowlodge of the first rudiments of the art, according to native practice, will be received into the establishment, and having been duly instructed in the various practice of each department, will become entitled to recommendations from the Officers of the Society, to fill the situations of gardeners in private establishments.

8.—The immediate superintendence of all the business of the Garden will be vested in the President, Native Vice-President, Secretary, and Treasurer, and Native Collector, by virtue of their offices, under the direction of a Committee, consisting of three principal officers of the Society; viz. the President, Treasurer, and Secretary, and of three Members of the Society, nominated at a general meeting; of whom two may be exchanged by rotation annually. The proceedings of this Committee will be subjected to the general control and correction of the Society. The journals, minutes, accounts, and all the records of the Garden will be kept distinct and separate from those of the general business of the Society, by the head gardener, who will act as Secretary to the Committee, and be resident on the spot. An annual report of the state of the Garden, and of the general course of the proceedings, together with an abstract of the accounts, after their audit, will be prepared by the Committee, for the information of the Members of the Society.

9.—It is deemed particularly expedient, that the expenses of the Garden should be kept distinct from the annual charges. Government has been pleased to give the ground of the Garden. This liberal act, and the favour with which the efforts of the Society have been hitherto regarded, have induced the expectation, that a sum adequate to such an abject may be supplied from the quarterly subscriptions of the Members of the Society, whose number may be expected to be increased

by this popular object of interest and attraction. From this source alone, it is hoped, that such an establishment may be created, as will at once answer all the ends of the Institution, and do honour to the Bengal Presidency.

10.—With respect to the annual outgoings for the Garden, these will be met by the appropriation of a specific sum out of the yearly income of the Society, which sum will be voted by the Society at the periods when the estimates of the income and expenditure of the current year shall be under their consideration. The amount of these annual sums will consequently depend on the future prosperity and members of the Society, and on the good will of its Members. To stock the Garden at the outset, the Society has already commissioned a large supply of grafted fruit trees from England, together with every variety of seeds; and there is little doubt that it will receive gratuitous contributions for this purpose, from every part of the country; consequently, neither of these sources of supply will form an item of out-going in the account for establishing the Garden.

11.—The admission to the Garden will be as extensive and general as it can be made, in conformity with the regulations of time and attendance which an establishment of this nature unavoidably requires.

12.—The produce of the Garden, in fruits and vegetables, will be exhibited to the Members of the Society, at their General Meetings, and at such others as may be specially called, in the intervals of the Meetings, and will, of course, be supplied in such abundance, as to offer more satisfactory exhibitions than can be expected at present, whilst supplies are derived only from private native gardens; cuttings of new or improved fruits, ascertained to be correct, will be distributed to the Members, at the proper seasons, from the garden: as also seeds of such new and improved vegetables as shall be procured from abroad or raised in the Garden, and cannot be obtained from other quarters.

13.—Trees of approved fruits, which have been ascertained to be genuine, being to be kept in the Garden for the express purpose of furnishing grafts and buds to all the Members of the Society; such as may be supplied with plants so obtained, will be certain of possessing the true sorts, which will be open to inspection every season in the Garden, and thus the inconvenience and disappointment so often experienced, and so much complained of, arising from the uncertainty and variety of names, will be less liable to occur.

14.—The propagation of well known species and varieties of plants will, therefore, be only for the purpose of keeping up the stock in the Garden, or of contributing to private collections, or for sending abroad in exchange for foreign fruit trees and plants.

With reference to the foregoing Resolutions, it was determined, that the Secretary be requested to procure a ground plan of the Garden, and immediately adjoining lands.

It was proposed by Mr. Ballard, and carried unanimously, that a gardener be procured from England, at a salary of Rs. 100 per month, exclusive of a free house in the Garden, and that Mr. Shepherd, of Liverpool, be requested, through the Secretary, to select a proper person, and to enter into such articles on the part of the Society, as he shall consider proper. – The following Gentlemen proposed by Mr. Ainslie as the Members of the Managing Committee, in addition to the Office Bearers of the Society, and unanimously elected, viz. Henry Wood, Esq. George Ballard, Esq., and Edward Barnett, Esq.

It was resolved, that the expenses of the Garden, during the first quarter, should be confined to Rs. 200 per month, and that the Committee make trial of the present establishment.

It was resolved, that all suggestion from individual Members of the Society, with reference to experiments in the Garden, be communicated to the Committee through the Secretary, and that Members visiting the Garden shall not interfere with the management pursued, nor give directions to the *mallies*. The Secretary was requested to arrange the completion of the lease with Mr. Palmer.

II.

The committee appointed, at a Meeting of the Agricutural and Horticultural society, on the 14th of January last, to enquire into the state of the Society and report thereon, do report as follows:—

1. That, on examining such of the books and papers of the society as have been furnished to their Secretary, your committee find no regular accounts of expenditure, and that no entry has been made in the book of accounts and correspondence since the 29th June, 1826. That, in the book of proceedings, those of 7th May, 1827, when the accounts of the Treasurers were submitted to the Society, the Garden established, the rules for its management and expenditure framed, and the Garden Committee appointed, are wholly omitted.

2. That your Committee have examined the accounts of Messrs. Alexander and Co. the Treasurers, and find, that nearly all the sums charged have been drawn for without explanation. Under these circumstances, your Committee are unable to give an opinion upon the expenditure, except that it appears to have been incurred, not only without the sanction of the Society, but in contravention of the rules laid down for the guidance of the Garden Committee.

3. That, by the accounts of the Treasurers, it appears, that the funds of the Society which at the period of the appointment of the Garden Committee, amounted to about Sicca Rupee 10,000, will be reduced to about Sicca Rupees 2,000, inclusive of the sum expected to be received from Government by the 1st of May next ensuing. That the annual income

of the Society does not exceed Sicca Rupees 3,400, including the Sicca Rupees 1,000 allowed by Government. That the annual expenditure is about Sicca Rupees 5,200, which may be classed as follows:—

Allypore garden,	3,000
Poosa garden,	1,200
Prizes,	1,000
Total, Sicca Rupees	5,200

It is, therefore, evident, that the Society cannot continue the present rate of expenditure, which has only been hitherto supported by a wasteful and ruinous call upon funds, of which the interest alone ought to have been touched. Your Committee, therefore, recommend an immediate retrenchment: 1st by giving up altogether the Garden at Poosa, which has been examined within the last month by one of your Committee, (Mr. Bruce,) who pronounces it to be in a state of the greatest neglect, and under most improper management; 2ndly by reducing the Alipore Garden to 100 Rupees per month at the utmost, which your Committee consider enough for any purpose of utility, and which saving may be at once effected by discharging the European gardener who, (your committee are informed,) does not wish to retain his situation. The whole expenses of the Society, inclusive of printing, would thus be brought within Sa. Rs. 200 per month.

4. Your Committee strongly recommend, that the officers of the Society should be annually elected, as it appears clearly, that a sufficient control has not been exerted over the affairs of the Society, which is mainly attributable to the vacancies which have taken place in the Committee not having been regularly filled up.

5. Your Committee have also considered, as they were directed, the proposition for an incorporation with the Asiatic Society, and think such a measure inexpedient, unless the Society cannot be otherwise kept up, which they do not apprehend to be the case; as they know that many gentlemen wish to become Members, and are only deterred by not being able to obtain information of the Society's proceedings.

6. Your Committee strongly recommend, as a most effectual means of increasing the utility of the Society, and keeping up an interest in its proceedings, a frequent publication of reports through the medium of the newspapers and other periodicals of the Presidency. In this manner the Society might collect and disseminate much useful information which, although unsuitable for insertion in a volume of Transactions, may be well worth publication.

7. Your Committee find, that the Society is pledged to Government, in return for the annual bounty received from it, to translate their transactions into two native languages, and that the money already received has been otherwise applied, no translations having been

attempted. They have great reason to believe, that the Native Members of the Society are consequently much dissatisfied, as they justly consider the publication of such translations as one of the most important objects of the Society. Your Committee consider this circumstance is an additional reason for reducing the current expenses, as the bounty of Government cannot, with propriety, be diverted from its original purpose.

8. Your Committee cannot refrain from expressing their confident hope, that a Society which may easily become of great advantage to the country, may not be suffered to dissolve for want of a little zeal on the part of its Members; and they are convinced, that a public appeal from the Society would bring an accession of many new Members, and much important information.

9. Your Committee conclude by recommending that a day be immediately appointed for electing all the officers of the Society, and fixing rules for their subsequent re-election and rotation, as the first experience of the Society has proved too plainly the necessity of a greater degree of vigilance and exertion than can be expected under the present system of management.

(Signed) WM. BRUCE,
F. JENKINS,
WM. COBB HURRY,

Calcutta,
31st March, 1829.

III.

TO C. K. ROBISON, ESQ.

Secretary Agricultural and Horticultural Society.

Territorial Department
Revenue.

SIR,

The Right Honorable the Governor General in Council being desirous of promoting the cultivation of cotton and tobacco of a superior description, as well as of improving the quality of raw silk, and of other articles of raw produce, calculated for the home market, and His Lordship in Council having observed, that the Agricultural and Horticultural Society have recently turned their attention to the above objects; I am directed to communicate to you, for the information of the Society, that the Government is disposed to co-operate in such measures and arrangements as may appear likely to conduce to the above end, and to request, that the Society will report, for the information of His Lordship in Council, the mode in which it may appear to them that the aid of Government can be most usefully given; it being

understood that it is not the intention of Government to interfere in any manner with the proceedings of the Society.

I am, &c.

Council Chamber, (Signed) E. MOLONY,
20th October, 1829. *Deputy Secretary to Govt.*

IV.

TO

E. MOLONY, ESQ.

Deputy Secretary to Government.

SIR,

I have the honor to acknowledge the receipt of your letter of the 20th October, 1829, which was this day presented to the Society at a general meeting.

In reply, I am directed by the Society to express how deeply they feel the importance of the promised co-operation of Government, and to assure you of the zeal and activity that will be excited on the part of the members, by the knowledge, that their labours will be favourably considered and assisted. The Society, deeply feeling the condescension of Government in requesting their opinion on the measures and arrangements that appear likely to improve the cultivation of cotton and tobacco and of other articles of raw produce, are particularly desirous to avoid touching upon any matter that might be deemed beyond their province, or seem irrelevant, to the particular point which they are required to answer. They, however, cannot refrain from stating, that, in their opinion, it is very difficult to give any efficient or permanent aid to the improvement of those products of which it is the particular object of the Government to promote the cultivation, except by means which are equally calculated to promote the general prosperity of agriculture. Upon those means they do not feel themselves at liberty to dilate, and they proceed to point out the mode in which. at present, they conceive the aid of Government can be most usefully given. The Society are of opinion, that the distribution of useful information in the Native and English languages, of new varieties of seeds and plants, and of premiums to successful cultivators are the most immediate means of showing what improvements can be effected in the great staple commodities of the country.

Limited as the resources of the Society have been, they can confidently speak, from their own experience, of the good effects of adopting such measures, by the great amelioration they have produced in Horticulture within the last few years—and it is, therefore, to be expected, that similar encouragement given to Agriculture would be attended with similar happy results.

To these measures the Society request the attention of Government, and respectfully solicit its aid. As experiments on a small scale lead to no certain results, and large ones are expensive, the Society think the scale of premiums should be high, and, if it meet the approbation of Government, would suggest, that the sum of 20,000 Rupees be placed at the disposal of the Society, to be distributed as premiums to the most successful cultivators of cotton and tobacco of a superior description, as well as to those who may improve the quality of raw silk and other articles of raw produce. The Society are also of opinion, that an annual distribution of prizes would keep up attention, and afford a fair encouragement to those whose efforts had been as great, though not as successful, as those of their competitors, and would, therefore, solicit an annual grant to such amount as Government may deem expedient. The amount of premiums, the conditions under which they are to be granted, and the mode of distribution, will be considerations, with which it is perhaps unnecessary to trouble the Government, but on which the Society will, of course, be ready to receive suggestions or instructions, if desired. The Society cannot conclude without expressing their gratitude to Government for the prospect thus held out to them of making their labours more extensively and permanently useful than they have hitherto been; and with such an extensive field, and such encouragement, they venture to hope, that they may, ere long, be placed on a par with the most important and most celebrated of similar institutions.

I have, &c.

(Signed) C. K. ROBISON,

Secretary to the A. and H. Society.

Town Hall,

25th Nov. 1829.

V.

To HOLT MACKENKIE, Esq.

Secretary to Government.

Territorial Department,

&c. &c. &c.

Sir,

The Agricultural and Horticultural Society have the honor to submit to you, for the information of the Right Hon'ble the Governor General in Council, the plan which they propose to adopt for the distribution of the sum of Rupees 20,000, which has been so liberally bestowed by Government. The Society are anxious to be informed how far the proposed plan meets the approbation of Government, and to re-

ceive any suggestions for its improvement that may render it more conformable to the intention with which the money was granted.

2. The plan proposed by the Society is as follows:—

That two distinct classes of premiums be offered. The first for fine samples. the second for large quantities.

FIRST CLASS,

OR

PREMIUMS FOR SAMPLES.

1st. For the best sample of raw sugar, the produce of the Bengal Presidency, in weight not less than 2 maunds,	Sa. Rs.	500
2nd. For the best sample of silk, not less than 5 seers,	„	500
3rd. For the best sample of native tobacco, fit for the European market, 1 maund,	„	250
4th. For the best sample of any foreign kind of tobacco, cultivated in the Bengal Presidency, 1 maund,	„	250
5th. For the best sample of Sea Island cotton, similarly cultivated, 1 maund,	„	250
6th. For the best sample of Upland, or Green Seed cotton, similarly cultivated, 1 maund,	„	250
7th. For the second-best samples of each of the above articles, one-half of the above premiums,	„	1,000

SECOND CLASS,

OR

PREMIUMS FOR LARGE QAUNTITIES.

FOR SUGAR.

1st. A premium of 40 Rupees per maund, for the finest quality of raw sugar, cultivated and manufactured in the Bengal Presidency; the sample to be not less than 50, and not to exceed 100 maunds: if the largest quantity be produced, the premium will be,	Sa. Rs.	4,000
2nd. 20 Rupees per maund, for the next best quality; as before,	„	2,000

SILK.

3rd. A premium of 40 Rupees per seer for the best silk, produced in the Bengal Presidency, in any quantity from 20 to 40 seers,.....	„	1,600
4th. For the next best silk, 25 Rupees per seer, as before,.....	„	600

TOBACCO.

5th. A premium of 40 Rupees per maund, for the finest quality, not less than 30, nor more than 50 maunds; if the largest quantity be produced, the premium will be,.....	„	2,000
6th. Fo the next best, 10 Rupees per maund,.....	„	500

COTTON.

7th. Fo the best Sea Island or Black-seed cotton, cultivated in the Bengal Presidency, from 30 to 50 maunds, 40 Rupees per maund,.....	„	2,000
8th. For the next best,.....	„	1,000
9th. For the best Green-seed or Upland, ditto, ditto, ditto.	„	2,000
10. For the next best,.....	„	1,000
		19,700
Remaining for advertising, &c.		300
Total, Rupees		20,000

3. CONDITIONS.

1st. That the competition shall be open to all persons whatever, whether Europeans or Natives, zumeendars or ryots.

2nd. That all articles shown shall be the produce of the Bengal Presidency.

3rd. That the articles shall not be culled or selected from a larger quantity of produce, but be, *bona fide*, the whole produce of the land on which it is stated to have been grown.

4th. That all competitors for premiums shall deliver (along with their specimens) minutely detailed statements of the place where the article was grown, quality of the land, nature of the soil, mode of cultivation, and of every cost down to delivery in Calcutta; and the Society shall be entitled to call upon the competitors for further details before finally according the premiums; the non-production of which will be held as sufficient ground for the refusal of any premium.

5th. That competitors shall be at the expense of warehousing the more bulky articles in such situations as may be convenient for inspection.

6th. That the first class, or fine samples, which gain the premiums shall be the property of the Society; and that the unsuccessful ones shall be returned.

7th. That successful candidates for the 2nd class, or large prizes, shall, previously to receiving the premiums awarded, deliver to the Secretary a sufficient quantity of the prize article to form a package fit for shipment; the Society retaining no claim on the remainder.

8th. That the articles sent in to compete for the prizes shall be accompanied with a number or distinguishing mark, corresponding with one on a sealed letter containing the names and address of the candidate, which is not to be opened till after adjudication, to prevent any bias or prejudice from being suspected.

9th. That when two or more specimens shall appear to be of equal, or very nearly equal, qualities, the Society will award the preference to the article which appears to have been produced at the least cost.

10. That the specimens brought forward by intending competitors for the prizes, shall be placed at the disposal of the Secretary of the Society, on or before the 1st day of May, 1832, and that the prizes shall be awarded on the 1st of June thereafter.

In the above scale of premiums, the Society have considered, partly, the relative expense of the cultivation of the above articles, and partly the greater importance which Government attaches to some of them; which last circumstance has induced them to propose higher premiums for cotton and tobacco than they would otherwise consider proportionate to the comparative expense of cultivation.

4th. In reply to the enquiries relating to the annual donation of 1,000 Rupees made by Government to the Society, I am requested to state, that the whole of the funds so given to the Society have been distributed in rewards for successful Horticultural exertions; in obtaining a regular supply from Europe of the best seed and grafted fruit-trees; in cultivating the Garden at Allipore; and in printing, in English, the Transactions of the Society. In future, in order to put the Government in possession of the disbursement of such sums as they may think right to grant to the Society, a separate account will be kept of the sums received, and a copy of it annually submitted to Government. The Transactions of the Society, in English, have already been forwarded to Government, and to the Court of Directors; and a similar number of the Bengally edition of the Transactions will be placed at the disposal of Government so soon as this edition, which is now in the press, is completed.

5th. In reply to the questions respecting the Garden at Allipore, the Society beg to state, that it has fully answered as a place for the collection and distribution of all seeds and plants which belong to Horticulture; and that the benefits which have resulted from it are visible in the great amelioration which, by its means, as well as by the distribution of premiums to native *mallies*, has been produced in Horticulture within the last few years. No attempt has yet been made to establish an experimental farm, the funds of the Society not having ever been sufficient for that purpose. Could the Society, however, hope for the assistance of Government, they beg leave to suggest, that such an establishment, on a sufficiently large scale, and in the vicinity of Calcutta, would afford the readiest and most effectual means of ascertaining how far many foreign plants, of a commercial and agricultural nature, might be introduced and successfully cultivated in this country; and also what improvements might be introduced in those which are already cultivated in the Bengal Presidency.

The following is a statement of the expense of such an establishment, on a scale of 500 bigahs, which has been recommended and furnished by Baboo Radacanta Deb, a Native Member of the Society, of well known experience in agricultural pursuits.

" For 1000 biggahs, or less, as the case may absolutely require :—

" 3 Head Farm servants, at 8 Rs. each, ...	,,	24
" 10 Subordinate ditto, at 7 and 6 each, ...	,,	65
" 20 Subor. Farm Servants, at 5 and 4, each, ...	,,	90
" Ploughs, Bullocks, Baskets, Hoes, &c. 200, or say	,,	100
" Conveyance and Superintendent, ...	,,	100
" Peon, &c. including contingencies, ...	,,	50
Total, Rs.....		429
" Say per mensem, ...	,,	500
" For each season, ...	,,	6,000
" For the two seasons, more or less, ...	,,	10,000

" From which will fall to be deducted the value of produce, which is estimated to repay the expense, even with a profit."

The Society is of opinion, that the improvements in the cultivation of cotton, as recommended by the Court of Directors, might be more accurately and economically tried by such an institution, than by any other method.

The Society would further take the liberty of suggesting, that, although granting bounties is generally condemned as a permanent system, yet, for temporary purposes, that it may be highly useful, and that it is their opinion, that if a bounty of about one penny sterling per pound were granted, for the term of three years, on the exportation of all cotton that might be found equal in quality to certain de-

scriptions now imported into England from the Brazils or United States, a very great and essential improvement would be introduced in the cultivation of that article, and that the money so expended would very soon be returned ten-fold; either directly by a small duty, or indirectly by the increase of commerce that would follow a successful cultivation of that important staple. The same would apply equally to tobacco, and probably to some other articles of produce.

7. The Society beg to express their grateful acknowledgement of the intention of Government, communicated in their letter of 29th February, 1830, to place at the disposal of the Society a considerable portion of the cotton and tobacco seed which the Hon'ble the Court of Directors are about to forward to the Presidency.

8. The Society have also to acknowledge the intention of Government to place a machine for the cleaning of cotton under the direction of the Society, provided two machines of this description are sent out by the Court of Directors. The Society feel assured, that a model of a machine for cleaning cotton, from which others could easily be constructed by the native workmen, would tend greatly to improve the quality of the cotton now produced in Bengal; the Society being fully convinced, that the cleaning of cotton from its seeds and impurities is a point of nearly equal importance with that of improving its staple.

9. The Society have received for distribution two parcels of cotton seed forwarded to Government by the commissioners at Moulmein; a portion has already been distributed, and measures have been adopted for disposing of what remains, as beneficially as possible.

10. The Society regret that so much delay has taken place in replying to the communications they have had the honor to receive from Government. It was deemed important, before they submitted, for the consideration of government, a detailed plan for the distribution of premiums, to collect the opinions of as many Members of the Society as possible; especially of those who are native proprietors of land. Much time has unavoidably elapsed before those opinions could be obtained, but it is satisfactory to the Society to be able to state, that, amongst so many persons of such very different habits and pursuits, the present scheme is in accordance with the sentiments of a great majority of those who have given their opinion, either verbally or in writing.

I have, &c.

(Signed,) C. K. BOBISON,

Secy. Agr. and Hort. Society.

Town Hall, 21st April, 1830.

VI.

W. H. MACNAGHTEN, Esq.

Offg. Depg. Secy. to the Govt.

&c. &c. &c

Sir,

I have had the honor of submitting to a meeting of the Agricultural and Horticultural Society of India, your letter bearing date the 7th of September last.

I am desired by the Society, in reply, to express their grateful acknowledgments of the liberality with which the Government have thought fit to comply with their suggestions, and to beg that, in conveying to the Right Hon'ble the Governor General in Council this expression of their thanks, you will also assure his Lordship of the earnest and anxious desire of the Society, by every means in their power, to further the objects with which the Government have thought fit to assist them in making this experiment on the cultivation of cotton and other articles of raw produce.

I have, &c.

(Signed,) C. K. ROBISON,

Secretary.

Town Hall, 13th Sept. 1830.

VII.

To C. K. ROBISON, Esq.

Secy. to the Agrl. and Hortl. Society.

Calcutta.

Sir,

As a member of the Society to which you are Secretary, I have to propose, that, as the situation of this place is admirably adapted for the establishment of a branch or provincial Society of Agriculture and Horticulture, it is the intention of the few Members of the Society at this place to appropriate a plat of ground for the purposes of a nursery, vegetable, and fruit gardens, should our proposition meet with the sanction, and be supported by the fostering care of the Parent Society.

2nd. The abandonment of the Poosah Garden, we understand to have been occasioned by the heavy expense it entailed on the Society. This will not be a matter of objection to the one now proposed, as we calculate upon no pecuniary assistance whatever from the Society; on the contrary, it is not unlikely we may be able to add to its treasury.

3rd. From the Parent Society we should look for seeds, fruit trees, plants, &c. not as absolute gifts, but rather as a deposit liable to be appropriated as the Society should see fit, when the different fruits of Europe and China shall have been grafted on country stocks and inured to the climate.

4th. We also consider that grafts and seeds, furnished from our intended nursery, will be better suited to the climate, both above and below us, than when subject to a more sudden change of temperature; and this observation applies equally to Nipaul, from which country it is our intention to procure whatever is rare and valuable, and endeavour to assimilate them to the climate of this place, previously to transmitting them to your Gardens, or to the Upper Provinces.

5th. Constant water carriage, both up and down, as also through several branch streams, seems to point out this place, as better calculated for a depôt than any other; the constant passing of strangers both up and down the river, a populous neighbourhood in Tirhoot, Sarun, and Shahabad, will bring the nursery into notice, and we hope a sufficiency of members to ensure the permanency of our intended undertaking, which cannot fail to be productive of great and extensive advantages to the country around us.

6th. It will remain for the Society, after due consideration, to authorize us to admit subscribers, who shall be considered as members of the Parent Society as well as of the Dinapore Provincial Society, and from whose contributions we consider we shall acquire a sufficient revenue not only to cover the expenses of our own nursery but, as before remarked, to assist the Parent Society.

I have, &c.

Dinapore, May 25, 1830. (Signed,) W. M. SAGE.

VIII.

TO C. K. ROBISON, Esq.

Territorial Department, Revenue,

Secretary to the Agricultural and Horticultural Society, Calcutta.

Sir,

I am directed, by the Right Honorable the Governor General in Council, to transmit to you, for the purpose of being submitted to the Society, the annexed copy of an extract from the proceedings of Government, in the General Department, under date the 27th ultimo, together with the papers (Nos. 3 to 7.) in original, which accompanied the same; and to request, that they will furnish Government with their opinion as to the best mode of making the experiment with the cotton and tobacco seed adverted to in the Honorable Court's dispatch.

2. The Committee are requested to state, whether they have invited communications from individuals who may be disposed to undertake the cultivation of cotton, tobacco, and other raw products suited to the home market, as suggested in the 11th paragraph of the Government resolutions, under date the 29th of December last; and which points do not appear to have been adverted to in your letter under date the 21st ultimo; and if such invitation has been made, whether any and what individuals have replied to it.

3. Should the Committee be of opinion, that the design of making an experiment in this species of cultivation by means of individual agriculturists is hopeless, and that success cannot be anticipated from any plan, without the assistance of Government, to be afforded in the manner, and on the principle described in your letter of the last mentioned date, His Lordship in Council would wish the Committee to ascertain where a piece of ground is to be had to the extent of 500 bigahs, to be farmed or purchased on reasonable terms, and which may be favourable to the growth of superior articles of raw products which it is intended to introduce.

4. The seeds will be forwarded to you on their arrival, but a portion, (if they are sent in sufficient quantity,) will be reserved for transmission to Bundelkhund, as determined in the 5th paragraph of the Government resolutions, dated the 29th of December last.

5. The Mint Committee has been requested to instruct Captain Forbes to place himself in communication with you, in order that, within a reasonable period after the arrival of the saw gins, sufficient for the purposes of public inspection, offices may be prepared to have them set up in any situation pointed out by the Committee.

You will be pleased to return the original papers with your reply.

I am, &c.

(Signed) W. H. MACNAGHTEN,
Offg. Depy. Secy. to the Govt.

Council Chamber,
The 18th May, 1830.

[Copy.]

(356.)

Extract from the Proceedings of the Right Honorable the Governor General in Council, in the General Department, under date the 27th April, 1830.

Extract from a Public General Letter, from the Honorable the Court of Directors, dated the 9th December, 1829.

2. Our letter of 1st July has acquainted you with the measures we were taking for obtaining from the United States of America, various kinds of cotton seeds, as well as the most approved machines used in the southern states of North America for clearing cotton wool from its seeds and impurities.

3. We have received the first supply of American cotton seeds, which have been drawn from the crop of the year 1828. This supply comprises seeds of the species known as Upland Georgia cotton, and seeds of the cotton of Louisiana, known in commerce as New Orleans cotton; both being of the description called by the planters "Green-seed cotton" the wool of which adheres to the seed with a considerable degree of tenacity, fully as much as in the common cotton of India. These are the kinds of American cotton which are most extensively used by the manufacturers of Britain. We have also obtained a supply of the seeds of Sea Island cotton, (which are black,) the wool of which is much esteemed for the fineness and length of its fibre.

4. We have likewise received six of the machines for cleaning cotton, called Whitney's saw-gins, two of which we shall transmit to your Presidency with the cotton seeds. We have desired our agent to send us a description of the method of using the saw gins in North America, and you shall be furnished with a copy as soon as it comes to hand. It is sufficiently clear, from an inspection of the machine, that it is put into motion by manual labour, by means of a wheel and winch, with a revolving strap upon the small pulley-wheel that forms part of the machine itself, as shewn in a sketch-drawing that will be found in the packet. The large wheel, or first motion, is very simple, upon which account, we suppose it has not been transmitted to us from America with the machines. A wheel of this kind can, however, be readily constructed in Inda.

5. We have caused a trial to be made, in our presence, of the working of the saw gins upon a small quantity of India cotton happening to be in our warehouses, which had been very imperfectly, if at all, divested of its seeds; and although this experiment was made under the disadvantage of the cotton being old, very dry, and much pressed together, the result seemed entirely to establish the merit of the invention.

6. The Whitney machine, which it is our desire to introduce into India, has been noticed in the Parliamentary papers of the year 1828, in a report of an American committee of commerce; where it is said to be "so simple in its construction, and so easily worked and "managed, that the negroes in the Southern States are employed to "work it." We cannot, therefore, entertain any doubt of the saw-gin being suitable to the purposes of cleaning cotton by the natives of India. We also conclude that the Indian workmen will be competent to fabricate such machines for general use; but in order to facilitate the bringing them into practice without loss of time, it is our intention to send you some separate sets of the circular saws, which are of iron, (not steel) as the only part of the machine, in the making of which there can be my difficulty. These detached saws will also be useful as patterns for the native smiths, for the guidance of whom we propose also, to

send a complete set of all the other parts of the machine which are of metal.

7. You will receive, with the before-mentioned articles, a small quantity of cotton seed of the growth of Demarara, in South America, which, although it is not unknown in India, we are desirous should be planted as a renewed experiment. It is of the black seed kind, like the Sea Island, of which the wool readily parts from the seeds, and probably will not require the application of a saw gin. This kind of cotton is cultivated with great success in the Brazils.

8. We shall also send a case containing 25 pounds of Maryland tobacco seed; which we are informed will be sufficient for cultivation upon a large scale, and it may, therefore, be tried experimentally in a variety of situations.

9. We transmit in the packet the following papers having referrence to the culture of cotton and tobacco, viz.

I. Remarks on the culture of cotton in the United States of America, which we have received from our agent with the cotton seeds.

II. Paper on the culture of tobacco in Virginia, received in like manner.

III. Statement of the best manner of cultivating New Orleans cotton, received in like manner.

IV. Extract from Capt. Basil Hall's Travels in North America, so far as regards the cultivation of cotton; but we must remark, that this Author's statement of the mode of cleaning cotton, by what he denominates Whitney's saw-gin, is not applicable to the machines now about to be sent to you; but evidently refers to another American gin, probably like that which we sent to India several years ago.

10. We are strongly impressed with the opinion, that nothing but attention and perseverance is required to make Indian cotton wool a productive article of export; and there is no commercial object connected with our Indian possessions of greater national importance. We desire, therefore, that the arrival of the saw-gins in India be made matter of general publicity, and that such extracts from the papers now sent in the packet as you may consider likely to be useful to the general cultivators, be published at intervals in the newspapers.

11. We have prepared the like supply of machines and seeds for consignment to our government of Bombay.

Ordered, that a copy of these paragraphs be sent with the enclosures * therein referred to, in original, to the Territorial Department, that measures may be taken in that department to make the experimental cultivation ordered by the Hon'ble Court with the seeds transmitted.

Ordered, that the engineers of the Calcutta New Mint be instruct-

* Paragraphs 2 to 11, (Nos. 3 to 7.)

ed, from the Territorial Department, to set up the two saw-gins mentioned in Para. 4 of the Hon'ble Court's letter; and to send one of them to the Town Hall for public inspection. The other machine, with the saw-gins expected from England, will be forwarded through the Board of Trade to the Commercial Resident at Etawa and Culpee, for his report upon its usefulness in this country.

[A true Extract.]

(Signed,) H. T. PRINSEP,

Secy. to the Govt.

Territorial Department,

The 18th May, 1830.

[A true Copy.]

(Signed,) W. H. MACNAGHTEN,

Offg. Dy. Secy. to the Govt.

(No. 654.)

To C. K. ROBISON, Esq.

Territorial Department, *Secretary Agricultural and*

Revenue. *Horticultural Society.*

Sir,

In continuation of my letter of 18th ultimo, I am directed by the Right Hon'ble the Governor General in Council to transmit, for the information of the Society, the annexed copies of extracts from the proceedings of Government, in the General Department, under dates the 27th April and 1st and 22d instant; and to request that you will take charge from the Export Ware House keeper, of the cotton and tobacco seeds received by the ships mentioned therein. Orders for the disposal of the saw-gins have been already issued through the Board of Trade.

2. You will be pleased, with reference to para. 4 of my letter of the date quoted above, to make up 6 small parcels of the cotton seed, for transmission to Bundelkhund and other districts of the Western Provinces, (the soil of which is favorable to the growth of the article,) by the Sudder Board of Revenue, to whom the necessary instructions will be issued.

I am, &c.

(Signed,) W. H. MACNAGHTEN,

Council Chamber, *Offg. Dy. Secy. to the Govt.*

The 29th June, 1830.

(Copies.)

[No. 362.]

Extract from the Proceedings of the Right Hon'ble the Governor General in Council, in the General Department, under date the 27th April, 1830.

SIR,

With reference to the letter of the Court of Directors in this department, dated the 9th instant, I am commanded to inform you, that the Court have consigned to the Governor General in Council, on the ship *Dunira*. One saw-gin for cleaning cotton-wool; eight casks of cotton seed, and one box of tobacco seed; and, on the ship *William Fairlie*, on saw gin and seven casks and one keg, of cotton seed.

For particulars I refer to the invoices and usual papers sent, of the respective ships.

I am, &c.

East India House, (Signed) P. AUBER,

London, the 31st Dec. 1829. *Secretary.*

George Swinton, Esq. or the Chief Secretary for the time being, to the Right Hon'ble the Governor General in Council, at Fort William in Bengal.

To G. UDNY, ESQ.

Genl. Dept.

Acting President, and Member of the Board of Trade.

GENTLEMEN,

I am directed by the Governor General in Council to transmit to you the accompanying copy of a letter from the Secretary to the Hon'ble the Court of Directors, dated the 31st December last, and to request, that you will take the necessary measures for landing the articles therein mentioned, which have arrived on the Hon'ble Company's ships *William Fairlie* and *Dunira*, and report the same for the information and orders of government.

2. The machines are to be sent to the New Mint to be set up by the engineers of that establishment. When completed, one is to be sent to to the Town Hall, to be there open for public inspection—the other may be furnished to the Resident at Etawah and Calpee, with orders to report on its usefulness in the country.

I am, &c.

Council Chamber, (Signed) H. T. PRINSEP,

The 27th April, 1830. *Secy. to the Govt.*

Resolution,—Ordered, that a copy of Mr. Secretary Auber's letter abovementioned, and of the orders issued to the Board of Trade in consequence, be sent to the Territorial Department, with reference to the separate extracts of this day's date to that department.

(A True Extract)

(Signed) H. T. PRINSEP,
Secretary to the Govt.

(No. 31.)

Extract from the Proceedings of the Right Hon'ble the Governor General in Council, in the General Department, under date the 1st of June, 1830.

GEORGE SWINTON, Esq.
or the Chief Secretary for the time being, in Bengal.

Sir,

With reference to the letter of the Court of Directors in this department, dated the 9th December, 1829. I am commanded to inform you, that the Court have consigned to the Governor General in Council, on the ship *General Harris*, one barrel containing thirty-three pounds of Virginia tobacco seed, of the growth of 1828, and one case containing twenty-nine pounds of the growth of 1829.

For particulars, I refer to the invoice, and usual papers, sent in the packet of the ship.

I am, &c.

East India House,
London, the 2nd Feb. 1830,

(Signed) P. AUBER,
Secretary.

To G. UDNY, Esq.
Acting President,
and Members of the Board of Trade.

Gentlemen,

I am directed by the Governor General in Council to transmit to you the accompanying copy of a letter from the Secretary to the Hon'ble the Court of Directors, dated the 2nd February last, and to request, that you will take the necessary measures for landing the articles therein mentioned, which have arrived in the Hon'ble Company's ship *General Harris;* and report the same for the information and orders of Government.

I have, &c.

Council Chamber,
The 1st June, 1830.

(Signed,) H. T. PRINSEP,
Secy. to Govt.

Ordered, that a copy of Mr. Secretary Auber's letter abovementioned, and of the orders issued to the Board of Trade in consequence, be sent to the Territorial Department, with reference to the extract of the 27th April last, to that department.

(True Extract,)

(Signed,) H. T. PRINSEP,

Secy. to Govt.

(No. 33.)

Extract from the Proceedings of the Right Hon'ble the Governor General in Council, in the General Department, under date the 22nd June, 1830.

(No. 140.)

TO THE RIGHT HON'BLE

LORD WILLIAM CAVENDISH BENTINCK, G.C.B.

Governor General in Council,

Fort William.

Board of Trade,

MY LORD,

We have the honor to state, with reference to Mr. Secretary Prinsep's letter of the 27th April last, that the saw-gins for cleaning cotton, therein referred to, have been landed; and that instructions regarding their disposal, in conformity to the orders of Government, have this day been issued by us to the Export Ware House keeper. We have now to solicit the orders of your Lordship in Council respecting the disposal of the cotton and tobacco seed also alluded to in the above communication.

We are, with respect, &c.

(Signed,) G. UDNY,

CHAS. MACKENZIE.

Fort William,
The 18th June, 1830.

TO GEORGE UDNY, ESQ.

Acting President, and Members of

the Board of Trade.

Genl. Dept.

GENTLEMEN,

I am directed to acknowledge the receipt of your letter, dated 18th instant, requesting orders relative to the disposal of the two saw-gins for cleaning cotton, as well as of some cotton and tobacco seeds

landed from the Hon'ble Company's ships *William Fairlie* and *Dunira*, and in reply, to refer you to my letter of the 27th April last, for instructions as to the disposal of the saw-gins. The cotton seeds and tobacco have been placed at the disposition of the Territorial Department.

I have, &c.

(Signed,) H. T. PRINSEP.

Secy. to Govt.

Council Chamber,
The 28th June, 1830.

Ordered, that a copy of the foregoing letter from the Board of Trade and of the reply be sent for information to the Territorial Department.

(A true Copy,)

(Signed). H T. PRINSEP,

Secy. to Govt.

Territorial Department,
The 29th June, 1830.

(A true Copy,)

(Signed,) W. H. MACNAGHTEN,

Offg. Dy. Secy. to the Govt.

IX.

REPORT OF THE HORTICULTURAL COMMITTEE.

In forming a report of the proceedings of the Horticultural Committee to be laid before the Society, your Committee have thought it proper to revert to the original intentions of the Society in establishing the Garden at Allipore, with a view to ascertain how far these objects have been attended with that success which the Society had anticipated.

At a general meeting of the Society, held on the 7th of May, 1827, it was resolved, that a Horticultural Garden should be established, and Mr. Palmer's ground, consisting of 30 bighas, was accordingly rented at the sum of Sa. Rs. 100 per month; with the understanding that the ground adjoining it, of about the same extent, should be added to it as soon as it could be procured.

The objects proposed by the Society were as follow:—

"The cultivation of the most approved and useful varieties of fruits, "to be planted and exhibited according to the different modes of "cultivation belonging to each class, comprehending indigenous as

" well as those of Great Britain and foreign countries. That new " fruits should be introduced, and these, as well as the descriptions " already known, were to be subjected to various modes of treatment, " in order to ascertain whether such fruits could be acclimated, and the " mode of culture by which they can be made most effectually useful " and productive.

" That esculent vegetables should receive no less attention than " fruits; that new kinds were to be sought for, and brought into com- " parison with those already in use; and the whole subjected to such " a course of investigation and experiment as would be the means " of ascertaining the best varieties of each species, as well as the most " advantageous modes of culture.

" That experiments of every nature appertaning to Horticulture, " whether to verify former results or to try new practices proposed, " should be undertaken and carried on with attention.

Your Ccommittee deeply regret, that from the utter worthlessness and negligence of the superintendent, or head gardener formerly engaged by the Society, and the absence of all records, it will be impossible for them to furnish a progressive report of the proceedings of former committees, and of their experiments and results from the first institution of the Garden; and it will only, therefore, remain for your present Committee to lay before the Society the measures they have adopted for the purpose of realizing the objects of the Institution since the Horticultural branch of the Society has been entrusted to their management.

Before enumerating the different operations and experiments which have been pursued during the brief period that the present Committee have had the superintendance of the Garden, it may be proper to notice the state in which the Committee found the Garden, on assuming charge, in the month of May of the last year.

The ground was crowded with plantain trees, timber trees, and decayed fruit trees of a worthless description, all tending to exhaust and impoverish the soil, and, in the opinion of the Committee, to render it unavailable for horticultural experiments. It was accordingly resolved, that before entering on any operations, a complete clearance should be made, which, with the sanction of the Society, was carried into effect. Your Committee having prepared the Garden in the manner deemed the most favourable for the purpose, determined on trying experiments in manuring the ground, and the following composts were prepared and collected.

No. 1.

Lime,	1	part.
Vegetable manure,	2	parts.
Soorkee,	1	part.

No. 2.

Lime,	½ part.
Cow-dung,	2½ parts.
Scourings of sewers,	1 part.

No. 3.

Lime,	1½ part.
Sand,	½ part.
Decayed cow-dung,	2 parts.

No. 4.

Lime,	½ part.
Old stable dung,	2 parts.
Vegetable manure and scourings of sewers,	2 parts.

No. 5.

Lime,	1 part.
Cow dung,	2½ parts.
Wood ashes,	½ part.

No. 6.

Lime,	1½ part.
Cow-dung,	1½ part.
Pit sand,	1 part.

Six plats of ground were then put under cultivation, each being well manured from the above detailed composts, and cropped with the same descriptions of vegetables, with a view of ascertaining, under what particular compost the most productive crops would be obtained. The result of these experiments, when fully ascertained, will be brought to the notice of the Society at a future period.

Your Committee have also endeavoured to obtain for the Garden, the finest description of fruit trees, and are happy to be enabled to state to the Society, that they have succeeded in procuring the following: viz.

Grafts from English imported apple trees upon loquat stocks.

Grafts from the celebrated Seville orange, introduced by the late Mr. Bentley.

Grafts from the Mozambique orange tree, introduced by Mr. Blacquiere.

Grafts from the nectarine trees, introduced by our late much lamented secretary, Mr. Barnett.

Grafts from some very superior peach trees, introduced by Mr. John Master and Mr. C. K. Robison.

Grafts from Europe mulberry trees.
" Fig-trees, from the Cape.
" Leechees, lately imported from Canton.
" Guavas from Manilla.

Grafts from Mangoe trees from Mahilla.
" " from Malda.
" " from Bombay.
" " from Gazeepore.
" " from Madras.
" " from China.
" " from Moorshedabad.

The annona chirimoya.

Sour sop.

Avocado pear.

A variety of the choicest pine-apple plants have been presented to the Society, by Mr. Gwatkin, of Madras, and by Mr. Alexander, from Dacca.

And the Society has also received the psidium guinensis.

Ake.

Aloo bukhara.

Apple, spondias dulcis.

Grape vines, Persian.
" Cape.
" White crystal.
" Gazeepore,
" Red Muscadel.
" Honey pod.

The following fruit-trees have, through the kindness of friends, been procured from the Eastern Islands.

The Dooka.
Namnam.
Mangusteen.
Nutmeg.

A variety of grafts have also been taken from trees already in the Garden, and the attention of the Committee has been called to the mode of propagating different species by layers, and also by the China mode of grafting, and successful experiments have been made therein.

Your Committee have also ordered, that every new tree received into the Garden should have a small spelter plate, containing a number, fastened to it when planted out, which numbers are entered in a book kept for that purpose, in which also the description of tree, the donor's name, and the manner in which such trees are disposed of, will, for the future, be regularly entered.

The Committee have endeavoured to carry into effect the resolutions of the Society, that such grafts and plants as can be spared should be liberally distributed to all applicants, and a considerable distribution has accordingly been made.

The former experiment, as to the culture of the grape vines, having failed, the vines have been removed to another part of the Garden more adapted for their cultivation; and have been replanted in a rich compost prepared for their reception, and strong trellis work has been erected for their support, to which they are now trained: The result of the present experiments shall, at a future period, be presented to the Society.

Your Committee have also to bring to the notice of the Society, that, from the fund raised by the liberal contribution of their friends, they have been enabled to erect a cistern of pucka masonry for the reception of the beautiful Madras bramin-lotus, and other aquatic plants; that they have purchased a pair of strong, efficient bullocks for the use of the Garden, together with such garden tools as were requisite. That an English pump has also been erected on the large tank, with moveable wooden troughs, for the purpose of irrigating the Garden. And that such books on Horticulture as were considered necessary, have also been procured.

Your Committee have also erected a new gateway and porter's lodge, and have caused the garden walks to be dug up and new-laid with kunkur. The borders have been dressed, and planted with flowering shrubs.

At the proper season of the last year, English and acclimated vegetable seeds were distributed to the members of the Society, as also to ninety native gardeners in the neighbourhood of Calcutta, on whom plants were likewise bestowed.

Your Committee have also sent English seeds to various parts of the Upper Provinces, for the purpose of being acclimated, but they regret to state, that considerable disappointment has been experienced, by one entire investment of seeds, sent out to them by Mr. Cunningham, having totally failed.

In consequence of this, your Committee have, under the sanction of the Society, taken the necessary measures to secure supplies for the next season from China, the Cape of Good Hope, the Isle of France, New South Wales, and the Neelgherries. Experiments are now under operation in pruning mangoe trees, raising asparagus, and celery, agreeably to the English modes, and potatoes from slips, or *cullums*. The attention of your Committee have also been particularly called to the cultivation of Virginian and Persian tobacco, and to the cotton from South America, Egypt, and Bourbon, from seeds presented to the Society by Mr. Smithson, in the name of his friend Mr. Rawson, of the firm of Messrs. Rawson and Co. of London.

Your Committee cannot omit to mention how greatly the Society is indebted to the unremitting attention which has been paid to the interests of the Society, by your present Secretary, C. K. Robison, Esq. and have thought it right to bring to the notice of the Society the

great success which has attended the cultivation of the West Indian arrow root, which was presented to this Society by that Gentleman. From about the 16th part of a beggah, upwards of 35 quarts of arrow root were prepared and distributed to the families of members, during the last season, and has proved of the first quality. A beggah of ground has been planted out by your Committee with off-sets from the above plants, which, it is confidently expected, will yield an equally productive crop of this valuable root for the ensuing season.

Your Committee do not think it necessary to dwell on the great advantage which the public here must derive from the introduction of an article of such constant demand, and for the supply of which the public has hitherto been obliged to look to foreign markets alone.

A new piece of ground has been rented, measuring 6 begahs, very conveniently situated, with reference to the Garden. It has been properly enclosed and richly manured, and appropriated to the cultivation of such productions as, although coming under the cognizance of the Garden Committee, do not strictly belong to garden culture. For the present it has been planted with arrow-root, coffee, plantains, and American flax; and will, in future, be available, for experiments in the cultivation and production of sugar cane and tobacco, according to the directions of the Society.

Before your Committee close their report, they feel it a duty they owe themselves, as well as to the Society, to represent, in the strongest manner, their sense of the great advantage the Society has derived from the constant attention which has been paid to the objects placed under the superintendence of your Committee, by Sir Robt. Colquhoun, Bart. who has kindly undertaken the office of Secretary to your Committee. Under his superintendence, the whole of the experiments attempted by your Committee have been carried into effect, and to him must the success, which your Committee trusts have in so many instances followed these experiments, be mainly attributed.

In conclusion, your Committee would beg to recall to the attention of the Society, that all the plans and experiments entered into by your Committee, are still in a state of infancy, and that your Committee can only hope their future reports may, in some degree, at least, prove that the expectations of the Society have not been disappointed, nor the care and attention of your Committee altogether thrown away.

For the Garden Committee.

(Signed,) WM. CAREY, *President.*

Calcutta, 11*th January,* 1830.

X.

APPENDIX TO THE REPORT OF THE HORTICULTURAL COMMITTEE.

Since preparing the accompanying report, your Committee have been furnished with a list of the prizes and medals which have been distributed by this Society to the different candidates, from the first institution of the Society to the present period, which your Committee have great pleasure in now bringing to the notice of the Society.

In so doing, your Committee cannot but advert, with feelings of the highest satisfaction, to the display of vegetables produced at the last annual exhibition, and distribution of prizes, at the Town Hall, on the 13th of January of this present year, a display which would have done honor to any climate, or to any, even the most improved, system of Horticulture. And when it is considered, that the greater part of the vegetables then produced, were, till within these last few years, of species wholly unknown to the native gardeners, and that their cultivation has been chiefly fostered by the support and countenance of this Society, your Committee must congratulate the Society on the great and practical benefits which have arisen from the exertions of this Institution.

Your Committee would now, also, briefly notice, that of the experimental comforts referred to in their 1st report, that detailed under No. 3, has been considered as by far the most successful, the vegetables produced therefrom, having been of a very superior quality.

Your Committee have great pleasure in stating, that their experiment in the production of celery, has been very satisfactory, and that the plants produced under their superintendence, have been considered, both in size and flavour, as very superior to those hitherto produced in India. The mode adopted was that pursued by Mr. Judd, and described in the London Cyclopædia of gardening, page 722, as follows:—Judd says, "I prepare the ground for transplanting, by trenching it two spades "deep, mixing with it in the operation a good dressing of well reduced "dung from the old forcing beds. I give it a second trenching, that "the dung may be better incorporated with the mould, and then leave "it in as rough a state as possible till plants are ready to put out. In "the ground thus prepared, I form trenches twenty inches wide and six "inches deep, at six feet distance from each other, measuring from the "centre of each trench before planting; I reduce the depth of each trench "to three inches, by filling in sufficient dung to fill them so much up; at "the time of planting, if the weather be dry, the trenches are well "watered in the morning, and the plants are put in, six inches apart, in "the row, in the evening; care being taken, by the mode abovementioned, "to keep the fibres quite wet whilst out of the ground *; as they are drawn

* When the plants are from two to three inches high, he pricks them out into a nursery bed, immersing the plants, as he draws them, in water, so as they may remain moist whilst out of the ground. The plants remain in the nursery bed till they become very strong.

"from the nursery bed, the plants are dressed for planting, and then "laid regularly in the garden-pan. The trench in which my rows of "celery are planted being so very shallow, the roots of the plants grow "nearly on a level with the surface of the ground: this I consider particularly advantageous, for as considerable cavities are necessarily formed on each side when the moulding takes place, all injury from stagnant water, or excess of moisture, is prevented. The trenches when planted are watered as may be required. He adds, that he prepares the ground for celery during the winter, and avoids putting much of a crop between the trenches, especially one that grows tall, as he finds that celery does best when it grows as open as possible."

The flax from North America, which was sown in November, produced a very abundant crop; but as your Committee was not in possession of any precise information, as to the process of preparing it, the seed alone was preserved for future experiments. Mr. Holdsworth, who is acquainted with the most approved modes of preparing the flax, has kindly offered the Committee the benefit of his experience in any future experiments.

A very luxuriant crop has been produced from the Virginia, and Persian tobacco seed, as mentioned by your Committee in their 1st report, and the leaf is now under preparation, according to the mode adopted in America. The result will be submitted to the Society, with specimens of the tobacco.

Your Committee would also mention, that they have been enabled to distribute 177 grafts from the choicest fruit trees, and 147 flowering shrubs, of a rare species, since the commencement of the present year; and they trust, that they shall be enabled, in the course of a short time, greatly to increase that number.

Calcutta, For the Horticultural Committee,

1st *June,* 1830. (Signed) W. CAREY, *President.*

List of *mallies* who have gained the medals and first prizes of the Agricultural and Horticultural Society for the best potatoes, colliflowers, cabbages, peas, asparagus, and strawberries, since 1st January, 1827, when these prizes were instituted, viz.:—

1st Exhibition and Competition of 1827, *held on the* 1st *Jan.*

Silver medal, and 40 Rs. to Ramtono, of Gobrah, for the best potatoes.
Ditto and ditto to Hullodhur, of Intally, for the best peas.
Ditto and ditto to the same Ramtono, for the best cauliflowers.
Ditto and 20 Rs. to the same Ramtono, for the best cabbage.

2d Exhibition and Competition of 1827, *held on the* 24*th January.*

Silver medal and 40 Rs. to Eusuff, of Moocheekolah, for the best potatoes.

Ditto and ditto to Suroop Doss, of Motee Jeel, for the best peas.

Ditto and ditto to Jaroollah, of Allipore, for the best cauliflower.

Ditto and ditto to Petumber Doss, of Moocheekolah, for the best cabbage.

3d Exhibition and Competition of 1827, *held on the 6th April.*

Silver medal and 40 Rs. to Petumbur Doss, of Mootee Jeel, for the best asparagus.

1st Exhibition and Competition of 1828, *held on the 9th Jan.*

Silver medal and 40 Rs. to Eusuff, of Moocheekolah, for the best potatoes.

Ditto and ditto to Cossinath Doss, of Chitpore, for the best marrowfat peas.

Ditto and ditto to Nubbo Kistine, of Kidderpore, for the best cauliflowers.

Ditto and ditto to Hulludhur, of Sunnae, for the best sugar loaf cabbage.

2d Exhibition and Competition of 1828, *held on the* 16*th Jan.*

Silver medal and 40 Rs. to Sona Oollah, of Moocheekolah, for the best potatoes.

Silver medal and 40 Rs. to Benauth, of Sunnae, for the best cauliflowers.

Ditto and ditto to Krishna, of Dum-Dum Road, for the best peas.

Ditto and ditto to Pitumbur, of Mootee Jeel, for the best sugar loaf cabbage.

Ditto and ditto to Ram Mohun Ghose, of Kidderpore, for the best cow of a true Native breed.

Exhibition and Competition of 1829, *held on the* 14*th Jan.*

Silver medal and 40 Rs. to Sumboo, of Dowlutpore, for the best potatoes.

Ditto and ditto to Sunkur, of Saum Bazar, for the best peas.

Ditto and ditto to Umeer, of Moonsulaga, for the best cauliflowers.

Ditto and ditto to Firoollah, of Moocheekola, for the best cabbage.

Exhibition and Competition of 1830, *held on the* 13*th Jan.*

Silver medal and 40 Rs. to Georroochurn Doss, of Moocheekola, for the best cauliflowers.

Ditto and ditto to Petumbur Doss, of Mootee Jheel, for the best cabbage.

Ditto and ditto to Unundu Ram, of Singoor, for the best potatoes.

And 200 Rupees was distributed to the different *mallies*, in small prizes.

XI.

Report of the Committee appointed on the 9th March last, to revise and regulate the distribution of Prizes in Vegetables and Fruits.

The annexed statement shows the number and amount of prizes which have been distributed among native gardeners from the commencement of such distribution.

There is at the end of the list an abstract of its contents.

As this system is considered to have operated beneficially in the general improvements of our market supplies, the Sub-committee recommend its continuance, with the modifications hereinafter proposed.

But as the object is not merely, or, indeed, principally, intended to reward the casual production of good vegetables, but to introduce a better system of Horticulture, the Society may, perhaps, make it bear more directly on that point than it now does; and since the giving *second prizes* for the same kind of vegetable has, there is great reason to believe, been abused, by individuals dividing the produce of their own gardens among two or three, and obtaining prizes accordingly, we should endeavour to guard against it as far as possible.

January Show.

1st. The Sub-Committee recommend, that prizes of one gold mohur (16 Rs.) each, be given for the best exhibition of the *following* products on the 1st of January in each year.

Potatoes,	Knole Cole,
Peas,	Turnips,
Cauliflowers,	Carrots,
Cabbages,	Beet,
Red Cabbage,	Celery,
Brocoli,	Lettuce,

the quantity being not less than 10 seers of things sold by weight, and of those sold by tale, 12 of the cabbage tribe and 6 of all others.

2d. That prizes of 8 Rs. each be given for the best of the following productions, provided quantities are not less than in the preceding proposition.

Jerusalem Artichokes,	Onions,
Bombay Jam,	Windsor Beans,

3d. That prizes of 10 Rs. each be given for the best exhibition of the native vegetables and fruits, as follows, in quantities of not less than 10 seers of things sold by weight, and not less than 24 in number of those sold by tale:—

Pulwal,	Cucumbers,
Brinjals,	Saug,
Pumpkins,	Plantains,
Sweet Potatoes,	Byar, or Kool,
Radishes,	

4th. That small sums of from 2 to 4 Rs. be given to a limited number of persons showing baskets of good miscellaneous assortments, whether vegetables not enumerated above, or of such descriptions, or of country fruits or flowers, as an encouragement to attempts and attendance.

No second prizes to be given.

March Show, to be held on the 1st March.

1st. That a prize of 40 Rs. and a medal be given for the best show of

Asparagus, not less than..... 200
Artichokes, not less than..... 12
Strawberries, not less than ..... 1 seer,

and that any man gaining the prizes for two out of the three, shall receive a further donation of 10 Rs. the things to have been seen growing by any member of the Horticultural Society.

2d. That prizes of 10 Rs. be given to a limited number exhibiting country fruits, vegetables, or flowers, or collections of such, to the extent of 10 candidates.

3d. No second prizes to be given.

June Show of Fruit.

That prizes to the following extent be given for fruit only, on the 1st of June each year :—

The best Mangoes, not less than 50 in number, Sicca Rupees 50
The best Oranges, not less than 20 in number,..... 50
The best Leeches, not less than 50 in number, ... 30
The best Peaches, in number not less than 25,..... 30
The best Pine-Apples, not less than 10, ... 20
The best Guavas, not less than 50,..... 20
Golaub Jaums, } 8
Black Jaums, }
Pomegranates, not less than 20,..... 16

September Show.

In order to encourage cultivators to produce good vegetables, both European and Native, at the period of the year where the deficiency is now very severely felt, and as a stimulus to the efforts of the native gardeners, at that season, might possibly, and in time, remove the dearth, either partially or entirely, the Committee propose first, that prizes of 20 Rs. be distributed on the 1st day of September in each year, for the best exhibition of any of the following English vegetables :—

Potatoes,	Turnips,
Peas,	Carrots,
Cauliflowers,	Beet,
Cabbages,	Celery,

Brocoli,	Lettuce, and
Knole Cole,	Onions,

and that prizes of 10 Rs. each be given for the best exhibition of the following native fruits:—

Custard Apples,	Pappias, and
Country Almonds,	Pumplenose.

The committee are of opinion, that for the first year of exhibition it will be judicious not to fix any high standard, as to quantity, of the September exhibition. They, therefore, propose, that exhibitors shall not be called upon to produce more than 2 seers of vegetables or fruits sold by weight, and 6 in number of those sold by tale.

2d. In the event of the following prize vegetables exceeding the prescribed weight or number, the Committee would then recommend an additional prize of 8 Annas per seer to be given, (to the extent of 20 seers,) on the excess in such things as are sold by weight, and 4 Annas each for the excess in such vegetables or fruits as are sold by tale, to the extent of 20.

Peas,	Lettuce,
Potatoes,	Brocoli,
Cabbages,	Turnips,
Cauliflowers,	Knole Cole, and
Celery,	Carrots.

Your Committee also propose, for the first show only, to give a silver medal, in addition to the money, prize, to the gainers of that prize on the following articles:—

Potatoes,	Peas,
Carrots,	Cabbage, and,
Knole Cole,	Cauliflowers.

3d. The Rules 4th and 5th of the January show to be applicable to the September as well as to the January exhibition. It is to be distinctly understood, that of the best vegetables or fruits exhibited at any of the shows are, (although the best shown,) still of an indifferent quality, it shall then be at the discretion of the Committee to award or withhold the prize, as may appear to them expedient. With respect to all prize fruits and vegetables, the prizes shall not be given until the exhibitors shall satisfy the Committee of the situation of the gardens in which they were produced.

The Committee strongly advise, that the officers of Government in and about Calcutta be provided with Bengally notices, and requested to make them public, stating generally the change in the arrangements for the distribution of prizes; the addition of the March, June, and September exhibitions to that of January, and intimating, that a new set of rewards has been established for the producers of fruits and vegetables, as per list at the exhibitions last mentioned.

The Committee further recommend, that *mallies* intending to become candidates, shall signify their intentions, and for what particular product

or products, one month before the respective exhibitions, stating their names, residences, and sites of their gardens.

That as many of these gardens as is practicable be visited by members of the Society, who may rocommend the proprietors for a reward, if the appearance of the garden indicate care, neatness, or an attempt at improvement.

That the Committee will, at some day previous to the exhibitions, suggest such arrangements as may prevent the confusion ordinarily attendant thereon.

The Committee recommend, that seeds be distributed as usual, and strawberry suckers from the Society's Gardens.

(Signed) T. PLOWDEN,
„ DWARKUNATH TAGORE,
„ H. M. PARKER,
„ G. BALLARD.

The 20th June, 1831.

N B. The statement alluded to in the commencement of this report was the same as that annexed to Appendix IX. with the following addition :—

Exhibition and Competition of 1831, *held on the 20th January.*

40 Rs. only to Eusuff, of Moocheekola, for the best cauliflowers; Eusuff received the medal twice before.

Silver medal and 20 Rs. to Hybutt Oolla, of the same place, for the second best cauliflowers.

Ditto and ditto to Ram Narrain Doss, of Mootee Jheel, for the best peas.

20 Rs. to Hulludhur, of Dum Duma, near Kidderpore, for the second best peas.

10 Rs. to Sunkur, of Saum Bazar, for the third best peas.

Silver medal and 40 Rs. to Mohun, of Baukoilos, for the best cabbages.

20 Rs. to Nubbokisto, of Mootee Jheel, for the second best cabbages.

Silver medal and 40 Rs. to Unundu Raum, of Singur, for the best potatoes.

20 Rs. to Mudun Doss, of Chinsurah, for the next best potatoes.

Thereafter 264 Rupees were distributed among the other *mallies*, in small prizes, varying from 10 to 2 Rupees.

XII.

Extract from the Proceedings of the Agricultural and Horticultural Society, at a Meeting held on the 3d November, 1831.

Sir Edward Ryan stated to the meeting, that the plants which the Society entrusted to his care all arrived at Chirra Poonjee, in excellent condition, and that, under the direction of Mr. Cracroft, they would be

planted in such places, and in such soils, as in his judgment might be best suited to their growth. That the seeds, also, had been distributed by him to the residents at Chirra Poonjee.

It might, perhaps, not be uninteresting to the Society to know, that the late Mr. Scott had established experimental gardens at three places in these hills; one at Chirra Poonjee, one at Myrung, and one at Nuncklow.

At Chirra Poonjee, the ground was certainly not well selected. nor were the plants in this garden flourishing: at *Myrung* the ground is rather too much exposed to the cold winds so prevalent there, and the soil not the best that could have been chosen; but notwithstanding these disadvantages, European fruits and vegetables thrive there—the fig is particularly luxuriant, and some plants of this description, taken from the Society's Garden, are now placed there. On the 23d September last, he found there excellent peas, lettuce, and new potatoes, small, but well flavoured.

At *Nuncklow*, which appears to have been the favourite residence of Mr. Scott, there is an experimental garden on a larger scale, and more attention appears to have been paid to its produce: all the European fruit trees appeared thriving, particularly the apple and plum; of the vegetables he could particularly speak to the new potatoes, of which he brought a supply to Calcutta, and which he would have presented to the Society, had it been possible to fix an earlier day for this meeting. Every place on these hills bears testimony to the liberal and philanthropic spirit of the late Mr. Scott, which led him to leave no experiment untried which might lead to useful and beneficial results. At Nuncklow, Mr. Scott had, at great expense, procured two fine English bulls, some English cows, and native cattle, in the hope of improving the breed; and there is every reason to believe, that the attempt would have led to great improvement in the breed of cattle, (of this description at least,) in this part of India. It was with great regret that he, (Sir Edward,) heard this establishment would be immediately broken up, and the cattle driven to the plains on the Gowahuttie side of the hills, and sold by auction, to such natives as might choose to become purchasers.

It might, perhaps, be not altogether out of place, to say a word or two upon the general character, production, and climate of these hills. After passing the valley of the *Bogapawnee*, about 14 miles north of Chirra Poonjee, the whole character of the hills is changed. The atmosphere becomes dry and bracing, and instead of tropical plants and trees, those of Europe begin to present themselves: the lowest point of the valley of the *Bogapawnee*, in the road from Chirra Poonjee to Moflong, is higher than Chirra. After passing Moflong, which is nearly 6000 feet above the level of the sea, the thistle, the fern, the nettle, the wild apple, the pine, and the oak, are to be seen, and there is every reason to conclude, that most European trees and plants would flourish on this side of the valley. Of the variety of flowers which appear in the grass, which is never higher than two feet, and generally about one foot, only a very experienced botanist can attempt to give any accurate description, but

certainly any common observer must be struck with the variety and beauty of the flowers with which the grass is so richly studded. Native huts and villages are but thinly scattered over the country; patches of cultivation, as is the case in all mountainous countries, appear on the side of the hills, and the land seems to be selected with judgment, and is certainly very productive. Of the crops he observed growing, was a root called *sooplong*, which the natives sow in April and May, and which is ready for use in October. There were several pieces of land sown with a white seed, called *kookorroo dhan*, which is also sown in April and May, and reaped in the beginning of November. The Indian corn is very fine and large, as is a species of cucumber cultivated by the natives.

Mr. Scott appears to have been strongly impressed with the opinion, that these hills might become of great importance as a sanatarium for the European inhabitants of Bengal. He, (Sir Edward,) so far as he was able to form an opinion, entirely concurred in Mr. Scott's opinion, that Chirra Poonjee is not the best spot that could have been selected for this purpose; but until our political relations with the inhabitants are placed upon some more secure footing, it is only to this place that Europeans could, at present, resort with any degree of safety.

There are many places of higher elevation, which appear very superior, in point of climate, to Chirra Poonjee; but Nuncklow is not one of those places: it, like Chirra Poonjee, is the first table land in ascending from the plains, though on the opposite side of the chain of hills, and consequently, like Chirra Poonjee, is much more subject to moist, fogs, and rains, than Myrung, and other places in the interior: spots might easily be selected near *Negemdee, Moreem, Moflong, Myrung*, and between the latter place and Nuncklow, which are well adapted for the purpose of a sanatarium; but Chirra Poonjee has fascilities for building which none of those places possess; there is an abundant supply of limestone on the spot, whereas none could be found, as far as he could perceive, after passing the valley of the Bogapawnee. It had other advantages, and a greater facility of access by the plains, which is of no slight importance when the greater part of the supplies must come from thence. As to temperature, nothing can be more delightful than Chirra Poonjee; the highest point that the thermometer ever reached, in the month of May, in the shade, was 76. In September of this year it was occasionally higher. Houses are rising rapidly at this place, and roads are being formed, which nothing but the want of funds will prevent from being very extensive.

Sir Edward concluded by stating, that Mr. Cracroft and himself have collected a number of geological specimens, and made barometrical measurements of different points in the hills, which he intended to submit to the Physical Class of the Asiatic Society.

Sir Edward further informed the Meeting, that on his leaving Chirra Poonjee Major Watson had furnished him with a number of plants peculiar to the Garrou hills, which had been forwarded on his arrival here to the Society's Garden.

XIII.

Circular to a portion of the Consuls of the United States.

Treasury Department,
September 6, 1827.

SIR,

The President is desirous of causing to be introduced into the United States all such trees and plants from other countries, not heretofore known in the United States, as may give promise, under proper cultivation, of flourishing and becoming useful, as well as superior varieties of such as are already cultivated here. To this end I have his directions to address myself to you in devoting your aid to give effect to the plan he has in view. Forest trees, useful for timber, grain of every description, fruit trees, vegetables for the table, esculent roots, and,—in short, plants of whatever nature, whether useful as food for man or domestic animals, or for purposes connected with manufactures, or any of the useful arts, fall within the scope of the plan proposed. A specification of some of them to be had in the country where you reside, and believed to fall under one or other of the above heads, is given at the foot of this letter, as samples merely, it not being intended to exclude others of which you may yourself have knowledge, or be able, on enquiry, to obtain knowledge. With any that you may have it in your power to send, it will be desirable to send such notices of their cultivation and natural history as may be attainable in the country to which they are indigenous; and the following questions are amongst those that will indicate the particulars concerning which information may be sought:—

1. The latitude and soil in which the plant most flourishes?
2. What are the seasons of its bloom and maturity, and what the term of its duration?
3. In what manner it is propagated by roots, seeds, buds, grafts, lagers, or how? and how cultivated? and are there any unusual circumstances attending its cultivation?
4. Is it affected by frost, in countries where frost prevails?
5. The native or popular name of the plant, and, (where known,) its botanical name and character?
6. The elevation of the place of its growth above the level of the sea?
7. Is there in the agricultural literature of the country, any special treatise or dissertation upon its culture? If so, let it be stated.
8. Is there any insect particularly habituated to it?
9. Lastly, its use, whether for food, medicine, or the arts?

In removing seeds or plants from remote places across the ocean, or otherwise, great care is often necessary to be observed in the manner of putting them up and conveying them. To aid your efforts in this respect upon the present occasion, a paper of directions has been prepared, and is herewith transmitted.

The President will hope for your attention to the objects of this communication, as far as circumstances will allow; and it is not doubted but that your own public feelings will impart to your endeavours under it, a zeal proportioned to the beneficial results to which the communication looks. It is proper to add, that no expense can at present be authorized in relation to it. It is possible, however, that Congress may not be indisposed to provide a small fund for it. The seeds, plants, cuttings, or whatever other germinating substance you may transmit, must be addressed to the treasury department, and sent to the collector of the port to which the vessel conveying them is destined, or where she may arrive, accompanied by a letter of advice to the department. The Secretary of the Navy has instructed the commanders of such of the public vessels of the United States as may ever touch at your port, to lend you their assistance towards giving effect to the objects of this communication, which is herewith enclosed for your information. It is believed, also, that the masters of the merchant vessels of the United States, will generally be willing; such is their well known public spirit to lend their gratuitous co-operation towards effecting the objects proposed.

I remain, &c.

(Signed) RICHARD RUSH.

Botanical Names.	*Popular Names.*
Papaver Somniferum,	Opium Poppy.
Cassia senna.	Senna plant,
Zinziber officinalis,	Ginger plant,
Tectona grandis,	Teak tree,
Durio zebethina,	Durian,
Musa paradisiaca,	Plantain tree,
Sansium domesticum,	Lancee tree,
Oryza sativa,	Rice, (upland species,)
Curcuma longa,	Turmeric,
Indigofera tinctoria,	Indigo,
Asclepias vomitoria,	Aûtomel,
Pterocarpus santalinus,	Ruskut chundun,
Santalum album,	Chundun,
Oldenlandia umbellata,	Che, or chay root,
Ligusticum ajouan,	Ajouan,
Nigella Indica,	Kalajeera, (Indian fennel,)
Gentiana Cherayti,	Churayta, (Gentian Root,)
Cæsalpinia bonducella,	Catcarinja,
Aralia Indica,	
Apocynia,	Which yields gum elastic,
Nelumbium,	Sacred bean of India,
Nepenthis,	
Terminalia,	

Canarium,	
Raki, (Diospyros Raki,)	
Nerium odorum.	
Cynodia hispanica,	The tree which produces incense, and which grows in the environs of Calcutta.
Hibiscus abelmoschus,	Musk ackra,
	Sandal wood,

Directions for putting up and transmitting seeds and plants (accompanying the above.)

With a view to the transmission of trees from distant countries, the first object of care is to obtain seeds that are fully ripe, and in a sound and healthy state. To this the strictest attention should be paid, otherwise all the care and trouble that may be bestowed on them, will have been wasted on objects utterly useless.

Those seeds that are not dry when gathered, should be rendered so by exposure to the air, in the shade.

When dry, the seeds should be put into paper bags; common brown paper has been found to answer well for making such bags. But, as the mode of manufacturing that paper varies in different countries, the precaution should be used, of putting a portion of the seeds in other kinds of paper. Those that most effectually exclude air and moisture, are believed to be the best for that propose. It would be proper, also, to enclose some of the seeds in paper or cloth that has been steeped in melted bees-wax. It has been recommended, that seeds collected in a moist country, or season, be packed in charcoal.

After being put up according to any of those modes, the seeds should be enclosed in a box; which should be covered with pitch, to protect them from damp and insects; and, during the voyage, they should be kept, in a cool, airy, and dry situation; not in the hold of the ship.

The oily seeds soonest lose their germinating faculty. They should be put in a box with sandy earth, in the following manner: first about two inches of earth at the bottom; into this the seeds should be placed at distances proportionate to their size; on these another layer of earth, about an inch thick, and then another layer of seeds; and so on with alternate layers of earth and seeds, until the box is filled within about a foot of the top, which space should be filled with sand; taking care that the earth and sand be well put in, that the seeds may not get out of place. The box should then be covered with a close net-work of cord, well pitched, or with split hoops or laths also pitched, so as to admit the air without exposing the contents of the box to be disturbed by mice or accident. The seeds then put up will germinate during their passage, and will be in a state to be planted immediately on their arrival.

Although some seeds with a hard shell, such as nuts, peaches, plums, &c. do not come up until a long time after they are sown, it would be proper, when the kernel is oily, to follow the method just pointed out, that they may not turn rancid on the passage. This precaution

is also useful for the family of laurels, (Larrineæ,) and that of myrtles, (Myrti,) especially when they have to cross the equatorial seas.

To guard against the casualties to which seeds, in a germinating state, may be exposed during a long voyage, and, as another means of ensuring the success of seed of the kinds here recommended to be put into boxes with earth, it would be well, also, to enclose some of them, (each seed separately,) in a coat of bees wax, and afterwards pack them in a box covered with pitch.

In many cases it will be necessary to transmit roots. Where roots are to be transmitted, fibrous roots should be dealt with in the manner herein recommended for young plants. Bulbous and tuberous roots should be put into boxes in the same manner as has already been recommended for oleaginous seeds, except, that instead of earth, dry sand, as free as possible from earthy particles, should be used; some of the bulbous and tuberous roots, instead of being packed in sand, may be wrapped in paper, and put in boxes covered with net work, or laths. Roots should not be put in the same box with seeds.

Where the seeds of plants cannot be successfully transmitted, they may be sown in boxes, and sent in a vegetating state. Where more than one kind is sown in the same box, they should be kept distinct by laths, fastened in it crosswise on a level with the surface of the ground in which they are sown; and, when different soils are required, it will be necessary to make separate compartments in the box. In either case they should be properly marked, and referred to in the descriptive notes which accompany them.

When plants cannot be propagated from seeds, with a certainty of their possessing the same qualities which long culture, or other causes may have given them, they may be sent in a growing state. For this purpose, they should be taken up when young. Those, however, who are acquainted with their cultivation in the countries where they grow, will know at what age they may be safely and advantageously removed. They may be transplanted direct into the boxes in which they are to be conveyed, or, where that cannot be conveniently done, they may be taken up with a ball of earth about the roots, and the roots of each surrounded with wet moss, carefully tied about it, to keep the earth moist. They may afterwards be put into a box, and each plant secured by laths fastened crosswise above the roots, and the interstices between the roots filled with wet moss. The same methods may be observed with young grafted or budded fruit trees.

Where the time will permit, it is desirable that the roots of the plants be well established in the boxes in which they are transplanted. Herbaceous plants require only a short time for this, but, for plants of a woody texture, two or three months is sometimes necessary.

Boxes for the conveyance of plants, or of seeds that are sown, may be made about two feet broad, two feet deep, and four feet long, with small holes in the bottom, covered with a shell, or piece of tile, or other similar substance, for letting off any superfluous water. There should be

a layer of wet moss, of two or three inches deep at the bottom, or, if that cannot be had, some very rotten wood or decayed leaves, and upon that about twelve inches depth of fresh, loamy earth, into which the plants that are to be transplanted should be set. The surface of the earth should be covered with a thin layer of moss, cut small, which should be occasionally washed in fresh-water during the voyage, both to keep the surface moist, and to wash off mouldiness, or any saline particles that may be on it.

When the boxes are about to be put on board the ship, hoops of wood should be fastened to the sides, in such a manner, that, arching over the box, they may cover the highest of the plants; and over these should be stretched a net work of pitched cord, so as to protect the plants from external injury, and prevent the earth from being disturbed by mice or other vermin.

To each box should be fastened a canvass cover, made to go entirely over it, but so constructed as to be easily put on or off, as may be necessary, to protect the plants from the salt water, or winds, and sometimes from the sun shine. Strong handles should be fixed to the boxes, that they may be conveniently moved.

During the voyage, the plants should be kept in a light, airy situation, without which they will perish. They should not be exposed to severe winds, nor to cold, nor for a long time to too hot a sunshine, nor to the spray of the salt water. To prevent injury from the saline particles with which the air is oftentimes charged at sea, (especially when the waves have white, frothy curls upon them,) and which, on evaporation, close up the pores of the plants, and destroy them, it will be proper, when they have been exposed to them, to wash off the salt particles by sprinkling the leaves with fresh water.

The plants and seeds that are sown, will occasionally require watering on the voyage, for which purpose rain water is best. If in any special case, particular instructions on this point, or upon any other connected with the management of the plants during the voyage, be necessary, they should be made known to those having charge of the plants. But, after all, much will depend on the judicious care of those to whom the plants may be confided during the voyage.

Plants of the succulent kind, and particularly of the Cactus family, should be planted in earth, but in a mixture of dry sand, old lime rubbish, and vegetable mould, in about equal parts, and should not be watered.

It may not be necessary, in every case, to observe all the precautions here recommended, in regard to the putting up and transmission of seeds: but it is believed, that there will be risk in departing from them, in proportion to the distance of the country from which the seeds are to be brought, and to the difference of its latitude, or of the latitudes through which they will pass on the voyage. It is not intended, however, by these instructions, to exclude the adoption of any other modes of putting up and transmitting seeds and plants, which are in use in any parti-

cular place, and which have been found successful, especially if more simple. And it is recommended, not only that the aid of competent persons be accepted in procuring and putting up the seeds and plants, but that they be invited to offer any suggestions, in regard to the treatment of the plants during the voyage, and their cultivation and use afterwards.

(CIRCULAR.)

Navy Department.

Sir,

I have to call your attention to the enclosed copy of a communication from the treasury department to the consuls of the United States at various ports; and to desire, that the objects of that communication may be promoted by you, on all occasions, as far as may be in your power.

The executive takes a deep interest in this matter, and, by particular attention to it, you will probably confer a lasting benefit to the country.

The letter of the secretary of the treasury is so full and satisfactory, that no further explanation seems necessary on my part.

You will be pleased to report to the department what you do in execution of this object, and return the papers to the department, when you are detached from the vessel which you now command.

I am, &c.

(Signed) SAM. L. SOUTHARD.

This is apparently an abstract of the directions annexed to the treasury circular to the consul's list of plants, and directions for putting up and transmitting seeds, esculent roots, whether for man or domestic animals, or the arts. To indicate particulars concerning latitude and soil where the plant flourishes. The seasons of bloom and maturity, and term of duration. Whether propagated by buds, roots, seeds, grafts, or layers, and any unusual circumstances which attend the cultivation. If affected by frost. The native or popular name of the plant, and (where known), its botanic name and character. The elevation of the place where it grows above the level of the sea. Is there in the agricultural literature of the country, any special treatise or dissertation upon its culture? Is there any insect habituated to it?

The first object of care is to obtain seeds that are fully ripe, in a sound and healthy state. Those seeds that are not dry when gathered, should be rendered so by exposure to the air, in the shade. When dry, to be put in paper-bags;—common brown is found to answer. It has been recommended, that seed collected in a moist country, be packed in charcoal. The oily seeds should be put in a box with sandy earth—first, about two inches of earth at the bottom; into this the seeds should be placed at proportionate distances to their size; then another layer of earth an inch deep—and so on alternately till within a foot of the top,

which space should be filled with sand, taking care that the earth and sand be well put in, that the seeds do not get out of place. The seeds will germinate on their passage, and may be planted immediately on their arrival. Some seeds, with a hard shell, as nuts, peaches, plums, &c. do not come up until a long time after they are sown; it would be proper, were the kernels oily, to follow the above method, that they may not become rancid. This precaution is useful for the family of laurels and myrtles, especially when they have to cross the equatorial seas. In many cases it will be necessary to transmit roots. Fibrous kinds should be dealt with in the following way, to guard against casualties, to which seeds, in a germinating state, are exposed during a long voyage; would be as well to enclose some (each seed separately), in a coat of bees-wax, and afterwards pack them in a box covered with pitch. Bulbous and tuberous roots should be put into boxes in the same manner as has been recommended for oleaginous seeds, except instead of earth, dry sand, free from earthy particles. Some bulbous and tuberous roots may be wrapped in paper, and put in boxes covered with net work or laths. Roots must not be put into the same box with seeds. When plants cannot be propagated from seeds, with certainty of their possessing the same qualities which long culture or other causes may have given them, they may be sent in a growing state. For this purpose they should be taken up when young. Those who are acquainted with their cultivation, will know at what age they may be advantageously moved. When they cannot be conveniently transplanted direct into the boxes in which they are to be removed, they may be taken up with the ball of earth about the roots, and surrounded with wet moss, and carefully tied up, to keep the earth moist. They may afterwards be put into a box, and the interstices between the roots filled with wet moss. The same method may be observed with young grafted or budded fruit trees. Where time will permit, it is desirable, that the roots be well established in the boxes. Herbaceous plants require only a short time for this, but for those of a woody texture, two or three months is often necessary.

Plants of a succulent kind, and particularly of the Cactus family, should not be planted in earth, but in a mixture of dry sand, old lime rubbish and vegetable mould, in equal parts, and should not be watered.

Teak tree, senna plant, ginger plant, (lancee tree, lansium domesticum,) durian, plantain tree, (Musa paradisiaca,) rice, (uplands species,) Asclepias vomitoria, Rackut chundun, (Pterocarpus santalinus,) Apocynia, which yields gum elastic nelumba, (the sacred bean of India,) Caesalpinia bonducella, (catcarinja,) Gentiana cherayta, Musk ochra, Hibiscus abel moschus; the tree which produces incense, and is said to grow in the environs of Calcutta.

NOTICE.

The accompanying number is the first of those in which it is proposed in future to print the transactions of the Agricultural and Horticultural Society. When sufficiently bulky to form a volume, a Title page and Index will be given.

A report of the progress of the Society with an Appendix containing such papers as could not properly form a part of the Society's transactions will be speedily published.

I.

ON THE BAIR OR BER TREE.

BY BABOO RADAKANT DEB,

[READ 15TH APRIL, 1829.]

TO C. K. ROBISON, ESQ.

Secretary to the Agricultural and Horticultural Society of India.

MY DEAR SIR,

As you were desirous of having a summary account of the treatment of the "Ber Tree," and which was an approved method of propogating it in this country, I beg to commit to paper, what I have been able to glean respecting this plant, and which I, accordingly, submit for the consideration of the Society, having taken pains to correct my own information and short experience on this subject.

This species of the "Bair, or Ber Tree," is, I may observe, from its peculiarities, to be considered a native production of India, from the earliest period. Its synonimous terms are, in the Sanscrit dictionaries, 1st "Badari," in reference to the original of the Hindee name "Ber," and "Coli," with that of the Bengalee name "Cool." It is called, in Arabic "Sidr," in Persian "Conar," in Botany "Jujube," and in Latin "Zizyphus Jujuba," or "Scandens."

According to the Purana," ("Hindoo Theogony or Theology,") there was, in former times, a celebrated place of pilgrimage, called "Badarica Srama," (the Badarinauth of modern travellers, or a town and temple on the west bank of the Alacananda river, in the province of Srinagur,) which abounded with the "Badari," or Jujube trees, and the devotees or sages of those times, lived upon this fruit; whence the tree was supposed to have been introduced more generally into other parts of India.

By a medical work, "Bhâva Pracâsa," it appears, that there are three kinds of the "Ber," distinguished by three distinct

appellations, and possessed of different qualities, viz. 1st, "Souvira*;" a large sort of fruit, and, in the ripe state, very sweet, cooling, and aperient; heavy, spermatic, and nourishing; good in allaying bile, heat, bloody affections, consumption, and thirst. 2d "Cola," of a smaller size than the former: when fully ripe, is sweet, yet burning, flavourous, hot; removes flatulency, yet is phlegmatic, bilious, heavy, and opening. 3d "Carcand'hoo," still smaller; is sour, astringent, sweetish, oily, heavy, bitter, and removes flatulency and bile. When dried in the solar heat, the Bair is opening, stimulant, light, and removes thirst, fatigue, and bloody affections. In the Materia Medica, "Raja Vallabha," the properties of the old or long preserved Bair are said to remove dryness and weariness, to act as a stimulant, and to lie lightly on the stomach; those of the pith or kernel of its stone, which is sweet, to act as an antibilious, and to prevent retching and thirst.

The indigenous species of Ber are also three; namely, sour, sweet, and jungly, (or wild;) the former is of a round size, hence it is called in Sanscrit "Vritta p'hala," (vide the Medical Treatise, "Raja Nighantu.") This acid fruit becomes sweetish and mucilaginous, when perfectly ripe, and is used by the Natives as a sauce or condiment with their food; it is also pickled with tamarind and salt. The sweet kind was formerly very rare here, or before the more western kinds were introduced. Some opulent natives had one or two trees of this species in their gardens, preserved with great care; and the fruit being somewhat shaped as a cocoanut, it was distinguished, in Bengalee, with the appellation "Narikely Cool." The last is wild, has a thorny bush, bearing small leaves, and acid berries, and being eaten by cowherds, it is called, in Sanscrit, "Gopa Ghonta," and in Bengalee "Sayacool," derived from the Sanscrit "Srigalcoly," (noticed in the Bharata Mallika's commentary on "Amara Cosha;") in Hindee, "Jungly, or Jhur Bair," and in Persian "Conare Dushtee."

All the large and sweet Bairs are the natives of the western districts: they are again distinguished as of three classes, viz.—"Nazook-Budun," Phil-Dundán, and "Furrokhabady." The first is delicate, elongated, pointed, and very common all over the Upper Provinces; the second is elongated in the form of an elephant's tusk, and is a native of Delhi; and the third is in the

* A native of the Suvira country, or a district apparently comprised within the Gangetic Provinces, inhabited by a people formerly known by the name of Siviras, and now called Suiras.

shape of an egg, or hog plum, and indigenous to Furrokhabad. The first sort of Bair is the produce of Rampoor and Furrokhabad; the second of Benares, the third of Patna, and the fourth of Calcutta.

I observe that, in Botany, there are sixteen species of plums; but none of these the natives of India, and that the indigenous kinds, although well known to Europeans, appear not to have been recognised in the English Encyclopaedia: the Revd. Dr. Carey has noticed them in the "Hortus Bengalenses;" as also Dr. N. Wallich has taken notice of the same.

The introduction of sweet Ber into the town of Calcutta was as follows:—about forty years ago, a friend of my father's had brought two large Bers from the garden of the Newab of Moorshedabad, and presented to him one of them. It was planted in a garden near his house, and reared with great care; a sapling was generated, and produced large and sweet fruit, which excited much curiosity in Calcutta; and a few plants, derived from that stock, were freely distributed amongst his friends.

The methods of propogating grafts in this country are four in common practice:—1st, "Dábá," which is done by bending and inserting a young branch into the ground, and watering it occasionally, till the roots are formed for transplanting; 2d, "Goolbundy," by attaching and binding some manured earth on a small branch, with a piece of sack, or matting of the cocoanut, and hanging over it a perforated water pot, to drop water upon it continually until the fibres or roots are formed and appear; 3d, "Paiwondy," which is, by inserting the scion of one tree into the stock of another, by slicing, or quartering parts of both, and fastening them together, till they are well united; finally, with some clay over them. These three methods succeed in about four months; and the 4th, "Ch'hulla Paiwond," or ring grafting, which is peculiar to the Ber trees, and was introduced here at first, in my father's garden, by a "Baughbaun," or gardener, who came from Delhi, upwards of thirty years ago, proved the most expeditious and successful of any; and having been communicated to others, was much preferred, and followed in this town and in the interior, whereby the good Bairs are become more abundant in the markets than formerly.

In the process termed Ch'hulla Paiwond, all the upper branches of the Bair trees should be cut off, at the end of February, leaving a stock 1 or 2 cubits in length, from which shoots will spring forth in a fortnight; and when they grow up

to the height of one cubit, which will be in about a month, the tops or heads of three or four young branches of a sour Bair tree should be cut off, so as to leave a space of four or five inches below, and then similar scions of the sweet Bair tree should be cut, and their rinds taken off, in the following manner. By holding one of the cut parts of the scions in the left, and an edged knife in the right, cutting out a little bark below and above the knots, and leaving each graft one inch long, together with an eye or knot; then drawing out a single ring of the bark at a time, with the right hand, holding one end of the scion with the left, or teeth, and wrapping a wet cloth round the ring or without it, taking care that the tubes or rings may not be broken, and soaking them in water; after which, by taking out the rinds of sour branches, according to the size of the graftings, and fixing on them the tubes or rings which were pulled out of the sweet kind, so as to make them stick fast; lastly, putting a shed over them, if requisite, to prevent the grafts from being withered, and cutting down all other shoots or branches of the acid Bair, but leaving the ingrafted ones. The eyes of the grafts will shoot through in a week or two, flower in July or August, and yield fruit in January, without altering or degenerating the graft. This method is now universally approved of, and has improved and converted sour and small Bairs, of this country into sweet and large ones.

I am,

My Dear Sir,

Your most obedient Servant,

RADHAKANT DEB.

CALCUTTA,
30TH MARCH, 1829.

II.

ON THE CAPE FIG.

BY MR. CRACROFT.

[READ 10TH JUNE, 1829.]

On my return from the Cape of Good Hope I brought with me three boxes of plants; many untoward accidents occurred to them on the passage, and, either from mismanagement after their arrival, or the season for potting them being unfavorable, I lost all the fruit trees, except two kinds of fig, and two kinds

of vine—of the flowers I saved the Viola *odorata*, the Strelitzia *regina*, and *juncea*—the Viola has been greatly multiplied in this country, and the Strelitzia *regina* is now in blossom. But the immediate object of my present address, is to recommend to the notice of the Society one of the figs which I preserved. A small tree was planted in March, 1828, at Dacca, being then about 18 inches high, and is now, (after 15 months,) nearly 8 feet high, full of branches, and has produced at least 30 fine well-ripened figs, of a bright, red color, and exquisite flavor, which have been much praised by all who have tasted them, and are greatly superior to any I have eaten in any part of India. As I gave a plant to Mr. Ainslie, and another to the late Mr. Barnett, the Society will have no difficulty in procuring a specimen of it in Calcutta; and I earnestly recommend the cultivation of it. My own plant has multiplied to the number of 18; some by cuttings, others by layers, and one by approach grafting on the Golur, (I believe Ficus *glomerata*,) but I can recommend only the method of increase by layer. I have tried to inoculate on the Golur, but could not succeed, and only one graft out of four took; of cuttings I have saved three, but every layer has answered; and in the rains they root sufficiently to be removed in a month. Should the plants I left in Calcutta have perished I shall be happy to send some.

It is necessary, throughout the year, but particularly in October and November, to guard against the attacks of a worm which breeds in the bark of the fig tree, and which, if not removed before it grows strong, penetrates into the heart of the tree, and would, unless killed, infallibly destroy it. I have not been able to detect the perfect insect which deposits the eggs in the bark; but the worm is betrayed almost as soon as it is formed, by a dark spot; it must be immediately removed with a sharp-pointed penknife. If it grows so large as to penetrate into the wood, it may be killed by repeatedly injecting a strong infusion of tobacco into the hole, with a common syringe; I have found this method of destroying all worms* which bore into fruit trees very effectual†.

I enclose some seeds of the Ferraria *Atrata*, which grew to the height of two feet, and produced, at least, 100 blossoms.

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* A drop or two of oil poured into the hole of the trees from which the excrements of the worms are discharged, by means of a small funnel made with plantain leaf, will effectually destroy them.

† Mr. C. adds, in a subsequent communication, that layers put down in pots during May, rooted in three weeks sufficiently well to permit them to be separated from the parent stem, without losing their leaves.

III.

DETAILS OF THE
CULTIVATION & MANUFACTURE OF SUGAR.

In the Pergunnahs of Chandpoor, Bijnore and Mindour, Zillah North Mooradabad.

BY N. J. HALHED, ESQ.

[READ 10TH JUNE, 1829.]

The land is broken up in the month of Assar, and, after being exposed to the rains for the season, is manured and ploughed eight or ten times after the rains, and being cleared of weeds, is again manured and ploughed four or five times in February. Just before the cane is set, 4 cart loads of dung to each cucha beega, in low land, and 5 in high land, is the usual allowance: in general a cane field is ploughed from 15 to 20 times; it is well rolled after the 4 last ploughings, and also after the cuttings of cane are set. When the cane is set, the field is fenced with *Urhur* sticks or other brushwood: 20 bundles of cane, each 210 canes, 8 inches long, are used for one kucha beega of land, in low land, and 25 bundles in high land; the value of the cuttings is at the rate of 5 bundles for 3 annas. When the shoots appear, which is generally in March and April, about 6 weeks after the cuttings are set, the earth, on each side of the cane furrows, is well loosened with a sort of hoe, with a sharp point, and broad leaf, in shape something like a masons trowel: this is done 7 times; (the first time it costs 7 annas; the other 6 times 3 annas each time,) and the field is laid out in beds and channels for irrigation. If the season is unusually dry, the fields, in the low ground, are watered in May and June, by means of wells dug for the purpose, as the water is not more than 12 feet from the surface: the price of labor for watering twice is 3 annas per beega, in the high lands. If there are no nullahs or ancient puckah wells affording facilities for irrigation, the cane takes its chance, as the cost of a kucha well, on the uplands, (from 10 to 20 Rs.) would be too heavy for an individual cultivator, and there are not many who would be found to agree to dig one in partnership, or could abstain from fighting about the water afterwards:—a kucha well, too, lasts but one season only, as the soil is light.

The khadur, or low land sugarcane, is ripe in Kartick or October; that on high lands in November, when all the inhabitants of the village are employed in the work, or in looking

on;—it is to them the most interesting period of their lives, whether they are concerned in the profit or not.

The sugar mill has been sunk in the ground, the furnace covered, the boilers fixed, and the earthen plates for casting the boiling sugar have been well dried in the sun, a store of fallen leaves have been collected to be used till the mill trash shall be dried sufficiently to serve for firing, and all preliminary arrangements made a fortnight before, when the village priest determines a fortunate day for the commencement of the work, after which the furnace never cools till all the sugarcane juice has been extracted and boiled; the mill, put in motion by the pair of bullocks, which are relieved from time to time, begins working at about 5 o'clock in the evening, and does not stop till 9 or 10 o'clock the next morning; this period of about 16 hours, more or less, is called *Oseruha* or dew fall, and the average produce is 12 Koondees of juice, each Koondee 6 Bahnees, each Bahnee 6 Syas, each Sya contains about 3 half pints English, or rather more; say that each Koondee then contains about 28 quarts, or seven gallons English, the average produce of a Koondee of juice, when boiled up, is 12½ seers of Goorh, each seer of 96 Sa. Wt.; the produce of the mill's work then is 175 seers, or 4 mds. 15 seers—the juice is formed into Goorh, which is the mere inspissated juice; Shukkur, which is a coarse granulated sugar, made by mixing a small portion of Reh or native soda with the Goorh, when it is in the melted state on the mud plate on which it is cast—the Rab or Khand, which is a finer production, and from which the molasses can be afterwards extracted by pressure, which is not the case with Goorh or Shukkur; a Koondee of juice will give an average of 15 seers of Rab; the night's work, or 12 Koondees, will give, consequently, 4 mds. 20 seers of Rab.

Koondees.	
Best land,.....	20
Next best,.....	16
Next,.....	12
Poor land or neglected,..	8
	4 16
Average, ..	14

The average produce of the beega of sugarcane is 14 Koondees of juice, as per margin.

Pucka beega 2304 square yards.

The following is a table of the expenses of a puckah beega of sugarcane cultivation, supposing that the owner has his own bullocks; the pucka beega contains 3 kucha beegas:—

*Land tax 3 kucha beegas, 3 Rs.			
13 As. 3 P. × 3	....	11	7 9
Carried forward,		11	7 9

* Not the Government land tax, but the rate levied by the malgoozar or contractor for revenue.

Brought over,	11	7	9
Ploughing 15 times, at 3 As. 9 P. pay of the ploughman, supposing the owner to have no kumherahs and unable to plough himself,.....	3	8	6
Rolling four times, ...	0	2	3
Manuring at 3 As. the kucha beega, if the dung is the field owner's property, otherwise double, ...	0	9	0
Cuttings for the plant at, say 20 bundles per kucha beaga, 12 As. 3 P. × 3,....	2	4	0
Hoeing and weeding 7 times, 1 R. 9 As. 6 P. per kucha beega, ...	4	12	6
Watering twice at 3 As. the kucha beega each time,	1	2	0
The Putwaree's fee ½ an anna per kucha beega, ..	0	1	6
The zumeendar and malgoozar will claim his fee at 2 As. per beega.	0	6	0
Total Rs.	24	5	6

EXPENSE OF MANUFACTURING SUGAR.

The whole of the labor is paid for in kind, and the mill and cattle are assumed to be the property of the owner of the field.

The Gooryee or boiler, receives a Sya, or rather more than 3½ pints of juice, which is not taken into account, and 3½ seers of Goorh or Shukkur, per diem.

The Perheeas, who put the canes into the mill, receive, between them, 6½ seers of Goorh.

One Jhoka or fireman, who feeds the furnace, receives, per diem, a Sya of juice and 1½ seer of Goorh.

The carpenter and blacksmith receive, for each day's work, between them, 2 seers.

Three Mootheeas, who make up the canes into bundles, to give to the millers, receive, between them, for a day's work, 1½ seer.

Two Gun-kuttas, or cane-cutters, receive, between them, 4 canes a day and 1½ seer Goorh.

The village chumar, for the leather used in the mill and harness, receives daily 1¼ seer Goorh.

If the field owner has a Kumherah, or hereditary ploughman, he will give him, at the end of the season, five seers of Goorh, a blanket, and a Rupee for the land he has assisted to till.

And the chowkeedar will also receive 5 seers of Goorh, at the end of the season, for watching.

Six Rupees a season are paid for the use of the set of 3 boilers, by those sugar cultivators who have united to hire them.

The daily expenses of the mill will be 16 seers and ¼; its produce is 3 mds. 30 seers of Goorh Shukkur, or 4 maunds of 20 seers of Rab.

The manufacture of the produce of one puckah beega will take up, say 3½ oserahas.

The manufacture will cost 1 md. 18 srs. Half the proceeds will be of Goorh and Shukkur, 13 mds. 5 srs.—of Rab, 15 mds. 13 srs. Deducting the expense of manufacture, the following will be the average net produce of sugar from the pucka beega of canes:—Goorh and Shukkur 10 mds. 26½ srs. Rab 14 mds. 11½ srs.; its value, Goorh at 17 seers, 33 Rs. 10 As. Rab, at 15 seers, 28 Rs. 7 As. Say that half the juice is made into Goorh, and half into Rab, the value of the net produce is 31 Rs. 0 As. 6 P.; from which deduct the land tax and expenses of cultivation, there remains to the cultivator a profit of 7 Rupees 1 Anna per puckah beega, of which say that 9 Annas more is deducted on account of the Chowkeedaree, hire of boilers, and other village expenses, 6 Rs. 8 As. clear profit remain for every pucka beega; and if he has Kumheras, or hereditary ploughmen, servants, and children, whose labor is available, he saves further, say half the expense of weeding, or 2. 6. 3., and the whole charge of ploughing and manuring, or 4. 1. 6., and of watering 1. 2.; total 7. 9. 9. for each pucka beega in addition.

This first crop is called Podha and in good lands the cane stumps are left for a second crop, called Perhee, by strong handed cultivators, (i. e.) those who have kumherahs and grown up sons and relatives in the family, available: the field, requires the following processes:

Watering, 5 times,	2	11	0
Manuring,	0	9	0
Hoeing and weeding, 5 times,	7	19	6
Putwarees' fees,	0	1	6
Malgoozars' fees,	0	6	0
	11	11	0

The value of produce will be nearly similar, say 30 Rupees, which, after deduction for land tax and expenses of culture, or in all Rs. 23 2 9, leaves a profit of 6 13 3 per pucka beega to the cultivator.

The following crop is either of wheat or Patna rice, or a mixed crop of mustard seed and barley, the returns of which will give from 6 to 6-8 Rs. per beega profit. It is seldom that poor lands are ever laid out in sugarcane, so the average of produce is in reality much higher than has been given above; while the expenses of culture and land tax are quoted at their highest rates—the canes are tied together and wrapped round with the leaves of the plant hoed and weeded—the cane tops (Azhola) used for feeding cattle, are not taken into account, as the sale price of what is not used for feeding the mill and ploughing cattle, (say 3 pairs of bullocks,) or about Rs. 4-8, is a set off against the wear and tear of ploughs, mills, and cattle. As few if any cultivate sugarcane who are not possessed of means and spare hands, sugar speculation is not a bad one for an agriculturist.

IV.

ON REARING PLANTS TO SEED.

BY W. INGLEDEW, ESQ.

[READ 10TH JUNE, 1829.]

The method used by the natives in Mysore, for rearing the seeds of the Carrot, Turnip, and Radish, so as to prevent the deterioration of those vegetables.

In India, and other hot countries, many culinary vegetables very soon become deteriorated; seeds are consequently imported from England every year; but these, from various causes, are often decayed, or dead, on their arrival. The following practice of the Indian gardeners, to procure good seeds, is of unknown antiquity: they first prepare a compost of buffalo's and swine's dung with red maiden earth, adding asafœtida, in the proportion of about three drachms to five quarts of the mixture, in a state of paste. The vegetables from which seeds are to be raised, are taken up when they have attained about one-third of their natural growth; the tops are cut off within a few inches of the crown, and also the tap-root; there remains now the edible part, from the bottom of which, to within an inch of the crown, are made two incisions across each other; entirely through the bulb. These bulbs are then dipped into the compost until they be well covered by it, both externally

and internally; they are then planted and watered, and speedily produce strong and luxuriant stalks, large blossoms, and abundance of seeds.

Innumerable roots are thrown out from the incised edges, which is probably the rationale of this part of the practice; the compost can hardly act in any other way than excluding the air, and promoting the healing of the wound; it may also afford some nourishment to the tender fibres, on their first appearance, while the asafœtida may keep off insects.

No. V.

ON THE MANGOE & PEACH TREES.

BY CHAS. KNOWLES ROBISON, ESQ.

[READ 10TH JUNE, 1829.]

No fruit in India, is held in such estimation by the whole mass of its population, from Dehli to Cape Comorin, as the Mangoe, and as it is also allowed to be extremely wholesome and nutritious, its cultivation and improvement ought to engage the attention of this Society. The Peach is comparatively little valued here, but it is undoubtedly a very fine fruit, and as its improvement appears to me to depend upon the same principles as the Mangoe, I have considered it proper to include the management of it in the same paper.

It has been observed that in proportion to the period of time required to bring any tree or fruit to perfection, the attempts to do so are few; and that any well established facts, or results of experiments, are still fewer, nothing being more discouraging than to commence experiments the results of which we cannot expect to verify in our own life time. From this cause the labour of gardeners has long been directed rather to obtain the best plants already known for quick bearing, than, by experiments, which require time and patience, to multiply varieties, and improve the qualities of each.

From the same cause perhaps it was considered of little moment upon what kinds of stocks grafts were taken, provided the tree to be grafted from was of good quality. In England for very many years, a belief prevailed, that the greater the difference between the stock and the graft so much the better might the fruit be expected, then, Peaches were crossed on

apricots and nectarines; and Plums of the finest kind procurable, were grafted on the stock of the wild one.

About forty years ago or upwards, Mr. Knight, President of the London Horticultural Society, not being able to satisfy himself, upon rational principles, why such a violation of nature should be advantageous, commenced experiments upon an opposite principle, in his own garden, which he continued to note with the greatest exactness and care; a long life has enabled him to bring all these to a conclusion, and to prove past all possibility of doubt, that the greater the outrage done to the ordinary course of nature, the smaller the chance of securing a favourable result.

Accordingly, in papers read by him before the London Horticultural Society, he exposed the practise then in force, and detailed the results of his own experiments; in one of these he states that although he was not yet master of the subject, he believed that he had seen the result of more experiments during the preceding 35 years than any other person; and that experience enabled him to say that whenever the stock and graft were not perfectly suited to each other, an enlargement took place at the point of junction, and extended both above and below it, thereby diminishing the growth and vigour of the tree, by the stagnation of a portion of the sap, which, in a tree growing on its own proper stem, would descend to nourish and promote the extension of the roots. Mr. Knight says further, that, whenever a Peach is grafted or budded on the stock of the most cultivated variety of its own species, the stock and budded or grafted stem remain very nearly of the same size both below and above the point of junction; no obstacle is presented to the ascent or descent of the sap, which appears to ascend more abundantly to the summit of the tree. It appears also to flow more abundantly into the slender branches which have been the bearing wood of preceding years, and these consequently extend themselves very widely comparatively with the stock and larger branches. When however a stock of the same species with the graft or bud, but of a variety *far less changed by cultivation* is employed, its effects are very nearly allied to those produced by a stock of another species or genus, as the graft generally overgrows its stock. The chief general conclusions which Mr. Knight says his experience enabled him safely to draw were, that a stock of a species or genus different from that of the fruit to be grafted upon it, can rarely be used with advantage, unless where the object of the planter is to restrain or debilitate, and that, where stocks of the same species

with the graft or bud are used it will be found very advantageous to select such only as approximate, (in their habits and state of change or improvement from cultivation) to those of the variety of fruit they are intended to support.

It has long been the practice of gentlemen and others in Calcutta to take grafts from any particular Mangoe or Peach trees which they considered superior, upon such stocks as are procured at all times from the native gardeners at Manicktollah, where these are reared in very great abundance for sale; but it must be obvious that these stocks have uniformly been reared from the unsaleable and worst description of fruit; as the natives could afford to purchase no others; nor, according to the prevailing opinion, were any better wished for or demanded.

The result of the experiments carried on by Mr. Knight on the stone-fruits of Europe having satisfied me that a great improvement might be effected in the cultivation of the Mangoe and Peach tree here, by following the practise so ably pointed out by him, I in 1827 (while acting as Secretary to the Society, for Dr. Wallich) sent a circular to such European and native gentlemen as I considered most likely to possess good Mangoe and Peach trees, requesting them to preserve for me the stones of all the fruits that they found decidedly superior; I received a number in consequence, which I planted in my own garden; and in the autumn of the same year I put about 50 of the most healthy stocks into large pots, to secure a full expansion of the roots during the operation of grafting. During the rainy season of 1828, I raised three dozen of grafts upon these stocks, taken from a tree of most superior flavour; four of these I sent to our garden at Allipore. Previous to this Mangoe season I sent circulars to the same purpose many native gentlemen and I have already received and planted many stones, from fruit which I am persuaded were of the most superior quality. When these are ready for potting I shall procure pots of a large size so as to secure the stocks being of the most vigorous description and resembling as nearly as possible the succulent quality of the extreme shoots of Mangoe trees (which circumstance Mr. Knight considers of vital importance) and during the rains of next year I shall take grafts upon them from the best trees which come to my knowledge and which I understand are to be found in the neighbourhood of Hooghly.

I did not succeed in procuring any Peach stones of a superior description, but as the greatest number and most success-

ful of Mr. Knight's experiments were upon this fruit tree, I shall take steps to procure the best stones from the upper Provinces, already placed in boxes of earth, and I look with great confidence to the result.

As the practice which I am pursuing is recommended by so great authority as Mr. Knight, and is from its simplicity and cheapness within the reach of every one, I have ventured to bring it to the notice of my brother Members of the Society in the hope that the experiment will be fairly tried in this country.

VI.

ON THE

CULTURE OF INDIGO IN BENGAL,

COMMUNICATED BY G. BALLARD, ESQ.

[READ 10TH JUNE, 1829.]

The Indigo cultivation of Bengal is confined principally to low alluvial tracts without much regard to soil, nine-tenths probably of the land bearing this crop is more or less under water by the end of July.

It is a very precarious crop in itself, and, from the low sites which it occupies, particularly liable to be lost by the encroachment of the annual inundation, if it happens at all earlier than usual. But in a favorable season, and in situations where it is safe from such destruction, having had also equal care in its treatment, it is perhaps as profitable as any other crop.

This precariousness however, together with his ordinary grain engagements, lead the ryott to consider the Indigo quite as a secondary product; he never gives it his best land, unless circumstances prevent his sowing it with grain; it receives the slightest preparation of the soil, and has scarcely any dressing during its growth. His sole object in engaging in its culture seems to be the advantage of a little ready money, which is commonly advanced by the manufacturer without interest, and perhaps to fill up spare land, or tracts new formed which he has not time to prepare, or which are too low for Rice.

This reluctance of the ryott has induced many manufacturers to engage in the culture themselves, but it has been found an expensive plan, profitable only when the dye was at its highest rate, and even then scarcely furnishing an adequate return. They not only could not cultivate so cheaply as the native labouring husbandman but ordinarily had to engage extensive tracts of land, much of which was not suitable for their purpose or perhaps for any other, and consequently, although the average rate of rent, was even low on the whole, it constituted a very heavy charge on the portion from which they obtained their return.

The periods of sowing in Bengal are, first, immediately after the rains, from about the latter end of October. The rivers are then rapidly retiring within their beds, and as soon as the soft deposit of the year has drained itself into a consistency, though not solid enough to keep a man from sinking up to his knees in it, they begin to scatter the seed broad-cast. This is continued until the ground has become too hard for the seed to bury itself, the plough is then used just to loosen the crust, and the sowing continued to about the middle or even the end of November, from which period the weather is considered too cold until February. These autumnal, are called October, sowings, from the month in which they generally commence. Much of the plant perishes during the months of December and January and more again in the spring, unless there are early and moderate showers. The crop that remains is not so productive ordinarily in the vat as that obtained from spring sowings, and some think the quality of the produce inferior. But there is no expense of cultivation, and, as I have above said, the exceeding liability of the crop to failure is such a discouragement to cost or labor in rearing it, that the October sowing is followed by most planters who can obtain suitable land. The second period of sowing is in the spring, with the first rains in March or even the end of February. The land having been measured and placed under its slight course of tillage during the two or three preceding months, is sown broad-cast as soon as the ground has been well moistened, or in even in prospect of approaching rain.

The quantity of seed used for the autumn sowing is generally more than what is considered requisite for spring sowing; six seers at the former and four at the latter season per biggah of Bengal, is the quantity usually allowed.

It may here be observed that the great supply of seed for Bengal cultivation is obtained from the Western Provinces, and

forms an article of trade of no inconsiderable magnitude. The stubble in the low land of Bengal is generally submerged before it has time to throw out fresh shoots, on which the blossom and subsequent seed pod are formed. There are however some high tracts reserved for that purpose and on these the plant is found well in flower in September, and the seed fit to gather in November or early in December.

The Indigo plant requires three months to attain its highest state of perfection for manufacturing, but is often cut from necessity, within half that time; for the approach of the river compels the premature removal of the crop, unless indeed its growth has been so retarded that it would not pay the expence of working. Most Indigo factories have consequently to begin in June or early in July, whenever they may have effected their spring sowings, and the labours of the season are commonly terminated by the middle or end of August.

It is difficult to say what can be considered an average crop; perhaps from ten to twelve bundles, over an extensive cultivation, in a good season, from each Bengal biggah, the sheaf or bundle being measured by a six feet cord or chain.

The usual terms of contract between the manufacturer and the ryott are, that the latter receiving at the time a certain advance of money, perhaps one rupee per biggah, with promise of a similar sum at a more advanced period of the season, undertakes to have a certain quantity of land suitably and seasonably prepared for sowing; to attend and receive seed whenever occasion requires, and to deliver the crop when called upon at the factory, at a specified price per bundle, or hundred bundles. The particular conditions of these contracts vary; generally in Bengal, they amount to advancing the ryotts two rupees for every biggah of land, furnishing him with seed at about one-third its cost, on an engagement from him to return whatever his lands may produce, (which as has been said is generally none at all) at the price charged; and receiving the plant from him at six, seven, eight or sometimes nine bundles for a rupee; much oftener the former than the latter rates. It will be seen that a ryott cultivating alluvial lands and having no seed, can hardly ever repay his advances, but it does not follow that he has been a loser, for he perhaps could not value his time, labor, rent, altogether at half the amount, and as long as this system is kept within moderate bounds, it answers much better than private cultivation to the manufacturer, and has many contingent advantages to the cultivator.

CULTURE OF INDIGO IN TIRHOOT.

Engagements with Assamees (Ryotts.)

Engagements with *Assamees* are generally made in the month of September, on a written instrument, called a *noviskaun*, by which they agree for a certain quantity of land for 5 years, to be cultivated with Indigo plant, and for which they are to be paid at the rate of 6 rupees per beegah, for every full field of plant measured by a *luggie*, or measuring rod. The *luggie*, it must be observed, varies in size throughout the district. In the southern and eastern divisions of Tirhoot and Sarun, it is 8½ to 10 feet long, and in the northern and western from 12 to 14 feet. The Assamee receives, on the day of making his *bundobust* or settlement, 3 rupees advance on each biggah he contracts for, another rupee per biggah when the crop is fit to weed, and the remaining 2 rupees at the ensuing settlement of accounts. Exclusive of the price of his *maul* or plant, the Assamee is entitled to receive 2 or 3 rupees per biggah, (as may be agreed on,) for *gurkee*, or lands that have failed, as a remuneration for his trouble, and to enable him to pay his rent.

The foregoing are the principal stipulations of the *noviskaun;* but further, the Assamee engages to give you such land as you may select, prepare it according to instructions from the factory, sow and weed it as often as he is required, cut the plant and load the hackeries at his own cost, and in every other respect conform to the orders of the planter or his aumlah. N. B. The Assamee is not charged for seed, the cartage of his plants, nor for the cost of drilling. I should mention, that a penalty is attached to the non-fulfilment of the Assamee's engagements, commonly called *hurjah*, viz. 12 rupees for every biggah short of his agreement, and that for every year that the *noviskaun* has to run. This is, however, seldom recoverable, for even if you sue the Assamee in court, and obtain a decree, (a most expensive and dilatory process,) he can, in most instances, easily evade it by a fictitious transfer of his property to other hands.

The planter generally finds it his interest to get the zemindar of the village, in which he proposes cultivating, to join in the *noviskaun*, as a further security, or he engages with a *jytedar* or head Assamee, having several others subordinate to him, and for whose conduct he is responsible. But a still better system is lately gaining ground in this district; I mean that of taking villages in *ticka* or farm, by far the best and cheapest plan that has ever been resorted to for the cultivation of Indigo.

Soils, quality, and level.

Our first care is directed to the selection of our lands. High *soomba*, or light soils, are generally preferred, being, from their nature and level, less exposed to the risk of rain or river inundation; but they are difficult to procure, and moreover require particular care in the preparation, of which more hereafter in its proper place. Next in estimation is *doruss*, a nearly equal mixture of light earth and clay; a soil more retentive of moisture in a dry season than any other. *Muttyaur*, or heavy clay soils, are generally avoided, although in certain seasons, with mild showers of rain, they have been known to answer. The safest selection I should conceive to be an equal portion of *soomba* and *doruss*. In a country, however, interspersed with jheels and nullahs, it is difficult to form a cultivation without a considerable mixture of low lands, more or less, according to the situation of the Assamee's fields. Great care should be taken, at all events, to guard against *oosur* lands, or such as abound in saltpetre; these can be most easily detected in the dry months. *Puchkatale*, that is, lands slightly touched with *oosur*, have been known to answer, as partaking more of the nature of a *doruss* soil, but the crop is generally thin, although strong and branchy. There is another description of land that should be cautiously avoided. It goes by the name of *jaunj*, and is a light soil, with a substratum of sand, from 6 to 12 inches below the surface. The plant generally looks very fine in such fields till it gets a foot high; when the root, touching the sand, and having no moisture to sustain it, either dies away altogether, or becomes so stunted and impoverished as to yield little or nothing in the cutting.

Of the *daub* or *dearah*, (alluvial,) land, there is scarcely any in the district, except what falls to the lot of my own factories, being situated on the banks of the Ganges and great Gunduck.

Of *baugur*, a stiff, reddish clay soil, there is little here; it pervades the Western Provinces, and is best adapted for *assaree* sowings, which do not succeed in this quarter.

Culture and preparation.

The preparation of Indigo lands should commence in September, as soon as the cessation of the rains will permit; and as we do not rely on rain for our sowings, (as is the custom in Bengal and elsewhere, and irrigation is never resorted to, from the heavy expense at-

tending it,) our principal aim is to preserve as much moisture in the fields as possible. They should receive, for this purpose, not less than 8 *chass*, or ploughings, beside a thorough *tumny*, or turning up with the spade, after the 4th *chass*, to clear the field from stubble, grass, and weeds. It is absolutely indispensable to get all this done, on our light soils especially, before the end of October, and have the land carefully harrowed or *haingered* down, so as to prevent the moisture escaping. Should there be heavy rain between the interval of preparing and sowing, it will be necessary to turn the fields up with either one or two *chass*, and harrow them down as before. If only a slight shower, running the *haingah* or harrow over them, will be sufficient to break the *pupree* or crust formed on the surface, and which, if allowed to remain, would quickly exhaust the moisture. This, with the occasional use of the *koorpee*, or weeding hook, is all that the lands will require till the sowings.

Sowing. The sowings here generally commence about the latter end of February, or beginning of March, if by that time there is sufficient warmth in the atmosphere to ensure a healthy vegetation; light soils are sown on one close *chauss*; heavy soils on two, with from 4 to 8 seers of seed, (80 sa. wt.) in proportion to the size of the biggah. After strewing the seed, the field should be harrowed down by two *pultahs*, or turns of the *haingah*, and then again by two turns more after the third day. In case of rain before the plant appears, which it ought to do on the sixth or seventh day, if a slight shower, the *haingah* should be used again; if very heavy, it were best to turn up and resow. If rain fall after the appearance of the plant, and before it has got past 4 leaves, and attained sufficient strength to resist the *pupree* or crust before alluded to, immediate recourse must be had to drilling. In fact the closest attention is required to watch the state of the young crop for a month at least after the sowings: if it yield the least or assume a sickly appearance, drills are our only resource. These, if applied in time, in all March, for instance, or before the middle of April, at latest, are generally successful, not only in restoring plants, but recovering such as may have become sickly from want or excess of moisture, or any other cause. In dry seasons they have been known to give a crop, when broad-cast sowings have failed. Each drill, with a good pair of bullocks, should do 5 biggahs a day; they are regulated to throw from 3 to 4 seers of seed per biggah, but the quantity can be increased or diminished at pleasure. The natives do not employ them in their grain sowings, but commonly adopt a contrivance

with their own plough for sowing in furrows, whenever their fields are deficient in moisture.

Weeding. This process generally commences with us about the middle of April. It calls for no particular observation, except that in dry seasons it should follow a shower of rain, or at all events be deferred until the plant is 4 or 6 inches high. I have known much plant lost by too early weeding and subsequent stress of weather.

Size of biggahs and produce.

Land is measured in durees, cottahs, and biggahs: 20 luggies in length and 20 in breadth make one biggah.

As before observed, the *luggie*, or measuring rod, varies throughout the district. The common Tirhoot biggah is, I believe, equal to 2½ or 3 Bengal biggahs, (about an English acre.) Its produce varies, also, according to the size of the *luggie*, the fertility of soil and accidents of season; 8 to 10 hackry loads, however, is generally considered a good average return. South and east of Tirhoot, 100 maunds from 600 biggahs, including koonti, or a second cutting, is reckoned a successful result. In other parts of the district, including Sarun, where the *luggie* is larger, the average produce is about one-third better.

As we measure our plant on the ground, the bundle system is unknown here; but I believe 45 to 50 Tirhoot hackry loads of plants, (estimated to yield a maund of dry Indigo,) will be found equal to 200 Bengal bundles.

Zeraut cultivation. *Zerauts*, or *neiz*, are taken on a pottah or lease for 5 years, at the average rent of 3 rupees per biggah. The heavy cost attending this cultivation has occasioned its decrease in most factories in Tirhoot, and particularly since the fall in prices. About a third, I believe, was the proportion it formerly bore to the whole cultivation of the district; but of late such factories only have retained it as cannot procure sufficient good land under the Assamewar system; but now, that the plan of taking villages in farm is becoming more and more prevalent here, it is very likely that *zerauts* will be entirely abandoned. From all the information I have been able to collect, the cost of a biggah of *zeraut*, (10 feet *luggie*,) may be estimated at 16 rupees; that of Assamewar is generally 25 per cent. less, both exclusive of interest, agent's charges, and private expenses.

CULTURE OF INDIGO IN OUDE.

The soil throughout Oude, or the Doab, is light and sandy; inferior, in general, for the culture of Indigo, to that of Bengal, and particularly so, to what is there known as "Mhutyal," or strong, dark, clayey land.

There are three different descriptions of culture, viz. *Kush Kurreeah, Bighowty,* and *Nij,* but the latter is a mere trifle in proportion to the others, and is, therefore, not worth mentioning*. Both are on contracts with advances; the Government assessment being so onerous, that the zemindars have not the means of sowing Indigo, or even grain, without advances.

There are two different kinds of sowings, viz., "*Jumowah*" or irregated sowings, "*Asaroo*" or rain sowings. The plant of the year before is called "*Khoonti.*"

On the *Kush Kurreea* system, the planter advances in February and March at the rate of a rupee for either.

5 Maunds of *Jumowah,*

3 Maunds of *Assaroo,* or

7 Maunds of *Khoonti,* to be delivered at his vats, and at the expense of the party he contracts with. A maund and a half is about a bundle of 6 feet girth.

On the *Bighowty* system, which prevails chiefly in the Meerut and Moradabad districts, the planter advances for a biggah of *Jumowah,* nine rupees, and for a biggah of *Assaroo,* 5 rupees 4 annas. The next year's plant, or "*Khoonti,*" becomes his on an additional payment of eight annas per biggah. He also supplies the seed, at the rate of six seers per biggah, being almost double the quantity made use of in Bengal, but which is necessary to make up for the destruction of plant the year following, by the frost, white-ants, hot-winds, grass cutters, and I may add, the village cattle, which are let loose to graze on the *Khoonti* during the latter period, when not a blade of grass or vegetation is to be seen any where else. The planter selects the soil from among the highest and best lands, and which are such as have, in the March and April preceding, been cleared of cotton,

The planter pays for the cutting and conveyance.

* Of the two former the principal cultivation is "*Kush Kurreea.*"

wheat, barley, and sugar cane crops. The latter are preferred, from the preparation they undergo previous to being sown. The sugar cane requiring great evenness of surface, richness of soil, and very extensive ploughing, manuring, and weeding. The principal sowings, however, are in the wheat and barley fields, which, from the crop they have already borne, require but little preparation, and are, therefore, sown after two or three ploughings at the furthest. The planter superintends the ploughing, sowing, and weeding, and is moreover empowered, at a certain time of the season, to measure the fields, and set off, by way of compensation, under the denomination of "*Naboode*," such portions of his cultivation as may, in the opinion of any two competent persons, be considered as inferior plant, and caused either from the lateness of sowings, badness of soil, or neglect in weeding; this concession, however, like all others from natives, is merely nominal; and although just, and most expressly and solemnly stipulated for at the period of the advances, is always resisted with fraud, or open force, at the measurement. The *Jamowah* is sown in May, and is irrigated every seventh or eigth day, until the setting in of the rains at the end of June. It is weeded twice, and is cut in August, immediately after the *Khoonti*, and often with it. It rises in general to the height of from 5 to 6 feet, and consists of a single stalk with branches, or rather a tuft of leaves at the top only. The average quantity per biggah of 160 feet square, is 20 maunds, or say 13 bundles. The produce is good, considering the great disproportion of wood over leaves. The colour good also, although inferior to that of the *Khoonti*. The second cutting hardly ever pays for the expense of carriage and manufacture, but is often necessary to protect the plant from the frost. This sowing never fails.

Sown in July, and cut at the end of September, at the earliest.

The *Assaroo* is very inferior plant; seldom rises above a foot and a half, and the average quantity per biggah is 3 maunds or 2 bundles. As it is never ripe enough to be manufactured before the end of September, when the nights become cold, and the fermentation weak, it is intended only as *Khoonti* for the year following, and as such is less liable to injury from the frost, white-ants, and hot-winds, than the *Jamowah Khoonti*. But the success of these sowings is very precarious, as they are never attempted but when the rains have fairly set in, and when often, either the seed in a state of vegetation, or the plant only a few days old, perishes under incessant and heavy rains of 12 and 15 days together. The produce is inferior in quality, but not in quantity, because the paste is hard and black.

Khoonti, which is the plant that is first cut, requires only to be ploughed after the first heavy fall of rain, and which promotes its growth very much. It rises to 3 and even 4 feet, and resembles, in every respect, the plant produced in Bengal from the dessee or country seed; as instead of running up into a mere tuft, as the *Jamowah* does, it branches out horizontally in every direction, and is full of leaves. The produce, therefore, in a vat of the same cubic dimensions, is greater than that of the *Jamowal**. The average quantity per biggah is about 15 maunds, or 10 bundles, but it is liable to failure from the frost and white-ants. As for 3 years' plant and *Khoonti*, it is a mere chimera, like the many others with which the planters have hitherto deluded themselves, and which it only requires a little experience and reflection to overthrow. A biggah may be cut here and there, on an extensive cultivation, but it can never be relied upon as forming part of the cultivation.

When seed is required, ¼ of the cultivation remains uncut, and the average produce per biggah is about a maund and a half. This, however, is very uncertain, and is liable to failure. Last year, the average produce was only about 10 seers per biggah. For quality, the *Jamowah* seed is the best, the grains being nearly twice as large as those of the *Khoonti*, but the latter produces it in greater abundance, and is the plant of which the planter gets the least on the *Kush Kurreea* system, because it weighs little, and is the reverse of the *Jawowah*, which the zemindars and ryotts take care always to cut as near the root as possible.

The *Bighowtee* system is a sad ruinous one, as independently of the attempts to assimilate *Assaroo*, at Rs. 5-4, with *Jamowah*, at 9 per biggah, which is very easily effected, if the planter is not very vigilant, he is obliged to maintain an extensive and imposing establishment of servants, not only to enforce the sowings, weeding, and cutting, but also to look after his *Khoonti*, and protect it from being destroyed by bullocks and grass-cutters, or from being ploughed up clandestinely by the zemindars themselves. The *Kush Kurreea* system again, has its evils too, as the planter never gets plant for the full amount of his advances, and hence, often his ruin.

The only observation that now occurs is, that, whatever may be the results of either system to the planter, under neither of them does the zemindar or the ryott derive any benefit from the

* And the quality too is better.

advance he receives, beyond the relief that it affords him against the immediate exigency of his *khists* to Government; for the present principle of assessment is only one of rack-renting, and the impolicy and cruelty of it is becoming more and more glaring, now that Indigo advances have been discontinued, and that the zemindars are, in consequence, falling into arrears to the collectors.

It is, perhaps, as well to add, that a biggah of land cannot be irrigated but by three persons, and never in less than six days; to do which, the ryott requires a pair of bullocks, which cost him at least 16 rupees, a bucket made of a white bullock-hide, at from 1-8 to 2 rupees, and a rope for a rupee more, both of which do not last him above a year. He never pays less than 4 rupees for a biggah of land near a well, and the produce of which, in Indigo, is as I have described. Grain is not more profitable, but cotton and sugar cane are preferred to Indigo. The former has its chances, and the latter, although less liable to failure, can never be undertaken but by a capitalist.

ON THE MANUFACTURE OF INDIGO.

BY H. PIDDINGTON, ESQ.

[READ 10TH JUNE, 1829.]

It may seem forward in one of my limited experience to write directions for the manufacture of Indigo; but, in the hope of being useful, I had rather do indifferently than not at all. I think I can put an intelligent person *in the way* of manufacturing well: much must always depend upon attention, and the adaption of local circumstances to general rules. I suggest, then, rather than dictate, the following precepts:—

1.—*Cutting the plant.* Stalks will re-produce shoots, but they give no Indigo; therefore, be careful that your people cut the plant at the place where the *yellow* leaves begin. Say rather better, that they leave as much of the yellow leaf as they can; the more stalk left the more buds, shoots, &c. for a second, or even a third cutting: the planter will find this well worth attending to.

Keeping the plant clean—in the shade—and preventing it from heating, are well known precautions. When procured from a distance, and particularly by bullock-carriage, have cylinders of

slight bamboo work, made like those with which the natives surround young mangoe trees, but coarser, and have one put into the centre of each bundle of plant: the cost of this is nothing; the bundle is not inconveniently enlarged, and I know, by experience, that, from its preserving a current of air through the midde of the bundle, it completely keeps the plant from heating for a length of time.

2.—*Stowing.*—Observe on which side the water comes into your vat, and if on one side only, begin to stow on that side;—observe, too, how the beams are let down, and always let them down first on the side at which you leave off: the reason for the first of these precautions is, that as the plant heats on the side on which you begin to stow before the other is finished, the water passing *through* it, cools it, and carries the heat equally throughout; for the second of them, that, as one end of the beam is bolted down to its place, before the other is pressed by the coolies, the plant, immediately beneath the fixed end, becomes more pressed than at the other; and this advantage should be given where the plant lies lightest, i. e. at that side where the stowing ends. Stowing *up and down*, as it is called, seems to be the best method: this consists in placing one row of plant nearly upright, with its stalk in the natural position; and the next row upon this, with the stalks in the air; by this means the top and bottom of the vat are mostly stalks and the middle leaves. Care should be taken to keep the plant as nearly upright as possible throughout; this perfectly prevents what is called burning.

In hot, close weather, it seems advantageous to press very little or not at all; merely laying the beams down, and bolting them. In cold weather the vat must be well pressed; and in very cold, rainy weather, it is of great advantage to allow the plant to heat a little before letting in the water; this increases the heat of the water, and upon temperature depends both fermentation and solution. It has struck me, too, that there may be, at times, too much plant for the water; that is, that there is more Indigo than the water can dissolve. Covering the vats with mats is advantageous; it both improves, by advancing, the fermentation, and saves time; it does this by preventing the vat from cooling.

3.—*Water.*—If good Indigo has never been made in a factory, have the water examined by some person competent to report upon it. Beware of native methods of clarifying water, by lime, alum, &c.

4.—*Fermentation.*—The time necessary, and the appearances

which a fermenting vat puts on are so variable, that it is next to impossible to lay down any rules: if rain has occurred, for example, the whole appearances are changed, and the time of fermenting may vary from 9½ hours to 18. When the froth begins to break, as if it had been taken off with the point of the finger —when large, dull-looking bubbles appear amongst it—when the liquid taken from the bottom has an oily appearance when dropping from the bamboo trier, (not so much so as to hang in strings, for it is then over fermented,)—when the smell, which is not disagreeable, begins faintly to indicate putridity in any part of the vat, it is time to let it off. It is useful to note the colour of the liquid, at the moment the plug is withwrawn; the first burst of it should be, in a well-fermented vat, of a bright orange—if it be reddish, the vat has been too much fermented; if only yellow, too little. As to time no rules can possibly be given; for vats close to each other will vary an hour, according to the plant, pressing, &c.; Generally, in hot, close weather, half fermentation is required. While a well-fermented vat is running off, there is a very peculiar smell, which I can only compare to that of a stale ham; if there be any putridity with this, the vat has been over-fermented.

5.—*Beating.*—Set your men walking about in the vat, as soon as the plug is taken out; and let them also move their paddles as soon as possible. In beating, that motion which drives the fluid in waves backwards and forwards, is said to be the best, particularly at first;—towards the end, that which is created by the men standing round in a circle, and tossing the fluid together towards the centre, seems preferable. No fixed rule can be given as to the time necessary to beat—the weather, the activity of the coolies, the state of the plant, the fermentation, all these and more causes, influence the state of the vat, and, consequently, the time necessary for beating. There seems less chance of losing Indigo by over-beating than by too little; but the produce, from an over-beaten vat is generally hard. Vats beaten purposely five and six hours, have been found to settle perfectly, and give fine Indigo in average quantities; while, though fine or finer produce was obtained from vats too little beaten, yet much less was generally found, because the waste water became green or dark coloured, and, of course, held Indigo in solution.

To judge of the beating, the common test is the use of the plate; I describe it here in conjunction with signs drawn from the appearance of the froth, and by attention to both, no person can find himself long at a loss. No attention need be paid till the vat is of a dark purple, or black colour, and the first froth is

all beaten down; if observed now, it will be seen that the froth is of a dazzling white, in the sun, and in fine bubbles. If the liquid be taken up in the plate, it will settle, but the fecula will be in black flakes, and the water of a pale, yellowish colour. When the beating has continued some time longer, the liquid in the plate no longer settles in flakes, but in grains, more or less coarse, which roll over like grains of sand, when the plate is inclined on one side: the water is now of a golden colour, and if the froth be observed, it will be seen, that it has changed its appearance from a fine froth, of a dazzling white, to a coarser one of a cream colour; in some instances, even to a brown. This change is sometimes very sudden, but it is always more or less a marked one, particularly by comparing two vats near each other, of which one is more forward than the other, and looking at them from an elevation; and, when the eye is once a little practised, it will be found, that, with the assistance of the plate, it is rare to have a vat spoiled in the beating; and this is a matter of much importance; for ill-beaten vats entail great loss. When the beating is stopped, the vat should immediately lose all its froth, and become a clear surface of chocolate brown, with clouds of blue in it; if it is not so something is amiss. Beating generally takes from one hour and a quarter, to two, or even three hours; all precipitants, such as lime water, are utterly unnecessary, and I believe always hurtful; nothing but clear water, and good plant are required.

6.—*Settling.*—From the time of the beating, celerity is of the first importance; *the best produce may be deteriorated by delay between the beater and godown.* As soon as your vat has settled, which should be in two or three hours, (some vats are built with the beaters too deep, which is a fault,) let off as fast as possible: experienced planters recommend two sets of plugs to each vat, to save time; and I approve of this highly. The waste or *pocha* water, which runs off, should be from a light to a dark madeira colour. I question much the accuracy of the prevalent opinion, that in proportion as it darkens it indicates over-fermentation, for, I think it may be in part owing to the proportion of stalks to leaves: with second cuttings, where the proportion of stalk is always great, the water will always be found darker, though the Indigo may be good. All green or dark coloured waters are dissolved Indigo, and a loss of produce.

Get the fecula from the vats into the mixing cistern as fast as possible; vats should be so contrived as to let fecula be brought from the most distant ones, while others are yet decanting: this offers two advantages; dirt is avoided, and if rain falls, it does

not, by mixing with the fecula, increase the quantity of it so as to overload the boiler: some time, too, is saved by commencing to boil as soon as possible.

Filter the fecula as it goes into the cistern before pumping up; the best method of doing this, is to have a box full of holes, in which is a net-work framing of bamboo at the bottom; in this is fitted, first a strainer of fine bafta, and then a filter of flannel, (common blankets are good, if not the best;) suspend this box at the mouth of the channel which brings the fecula. This will be a slow operation if the box be not large; but its advantages are very great in freeing the Indigo from sand and dirt; the fecula should also be pumped upon a filter, placed over the copper, and again filtered in passing from the boiler to the draining table.

Boiling.—Matters should be so arranged as to boil immediately, for all delay is deterioration; it is an excellent plan to have water boiling in the copper by the time the first fecula is pumped into it; let it boil for 3, 4, or 5 hours, (with plenty of water,) until it exhales *an agreeable, sugary smell,* and not the sickly one which it first gives out; boil on till you get this smell distinctly. All methods which allow fecula to remain without boiling, are bad; there is both loss and deterioration by the new fermentation which goes on. If there is too little fecula to boil, add three times its quantity of clear water; this will considerably retard the secondary fermentation, which takes place during the night. I have tried filtering Indigo on the tables twice, before and after boiling, but the advantage derivable from carrying off a larger quantity of the brown extractive matter, was more than counterbalanced by a darkening of the colour, which I attribute to delay. I have not yet tried the effect of washing it upon the filter with warm water; but I fear it might render it brittle in the cake.

Filtering.—This is necessarily a slow process, and it should be shortened in every possible way. I use, with great success, the syphon, and a contrivance which I call a decanting frame. When the fecula has settled on the table, a syphon of lead pipe, of a small bore, will draw off the fluid from the top, to within three or four inches of the fecula, without disturbing it, if carefully managed by hanging the syphon to a beam, with a string: when this is done, if a stout frame of wood has been placed under the bamboo net-work on which the cloth lies, it may be gradually raised at one end; (a winch is required, for the weight is very considerable;) so as to throw all the fluid gradually to the other, where the syphon will again draw off the whole.

9.—*Pressing.*—By carefully husbanding time, the fecula may be put into the boxes while yet warm:—these should be made double; a small frame to set on the top of the large one, to be taken off when the cake is pressed half down; the custom of using only one frame, and adding fresh fecula to bring the cake to its thickness, is very bad, and wastes time. The holes of the frames should be numerous, and constantly cleaned, by driving a stout wire through them; this will both expedite the pressing, and prevent fractures of the cake: the time of pressing should not exceed seven or eight hours; and the cakes, when cut, should be so hard as not to yield to the finger and thumb in the least.

Cutting.—If a cake breaks, wet it lightly, and press the pieces together. Breaking up cakes to press again hurts colour. Carry the cakes to the godown on a tray, with two or three dry folds of cloth under them; let them remain on cloth for three or four days, and then place them on the stages, with, at least, their own bulk of interval between them; the more the better. The cakes should preserve, for three or four days, the sugary smell alluded to under the head of boiling; if they do not, they have not been sufficiently boiled. It seems disadvantageous to turn the cakes, inasmuch as it throws the moisture back to the centre; and this, when the dry weather comes on, cracks them. I think it of great importance, that a godown be well lighted; for in the absence of light, the minute fungi, which give the fine white coat on Indigo, do not grow so well, and in perfect darkness would probably not grow at all.

Cleaning.—Very soft blacking brushes are the best; all hard ones should be avoided, for they take off the white coat, which adds greatly to the appearance of the cake.

VII.

ON THE EARLY SOWING OF

CABBAGES, CAULIFLOWERS, PEAS, &c.

BY C. K. ROBISON, ESQ.

[READ 13TH AUGUST, 1829.]

From an experience of nine years, the duration of this Society, I have found, that in order to have good and early crops of cauliflowers, cabbages, peas, turnips, &c. it is absolutely neces-

sary to sow only acclimated seed; that is, seed which was the produce of plants raised from imported European or foreign seed, sown during the previous year; and that, for the later crops, Cape of Good Hope and Van Dieman's Land seed answer best.

European seeds should never, in my opinion, be sown before the 1st November, and the produce should be chiefly reserved as acclimated seed, for the following season. Hitherto, the distribution of English seeds to the Members of the Society has been the cause of uniform disappointment.

VIII.

CULTIVATION OF COTTON.

BY W. BRUCE, ESQ.

[READ 13TH AUGUST, 1829.]

Having resided many years in Persia, and noticed the mode of culture of the cotton plant, I beg leave to submit my observations to you, for the purpose of being laid before the Society, if you deem them worthy of notice.

COTTON, AS CULTIVATED IN PERSIA.

This article is much cultivated throughout Persia, from the shores of the Persian Gulph to the Caspian Sea; particularly so in the low country, below the range of mountains along the Persian Gulph, and the nearer the sea coast the finer the article is: along this belt of land, from the base of the mountains to the sea, which varies in breadth from ten miles to about twenty-five, the plant lasts many years,—indeed as long as twenty to thirty: during this time the ground is often ploughed up between the plants, and sown with wheat and barley. The soil is mostly sand, mixed more or less with shells, and a small portion of loamy clay. I cannot say exactly the quantity which a plant yields, but it is very considerable: after the cotton is picked, sheep and goats are turned in to graze on the leaves and shoots, which, no doubt, tends to enrich the soil, and improve the staple; after the cattle have left nothing but bare stalks, the poor women and children resort to them for firewood, and break them down close to the ground. When the season returns, these stumps send out fine shoots, which are soon covered with leaves, flowers follow, and then the cotton as luxuriant as ever.

The cultivation of cotton in the interior of Persia is, however, annual, the same as in most parts of India; the produce is greater, as it is irrigated, which the other is not; but the article is much inferior, both as to staple and fineness. This leads me to suppose, that the sea coast cotton is improved, not only by being grazed on, and thus manured, but also from its superfluous stalks being broken off, which preserves all the moisture to the root, which otherwise would be required to nourish the stalks, and thus leaves the root in a vigorous state, to throw out fresh shoots in the proper season; while, at the same time, I am much inclined to think that the sea-air has a good deal to do towards making the staple finer and better. On the sea coast of the Persian Gulph, the nankeen cotton is very extensively cultivated, and manufactured into a very decent sort of nankeen.

As the cultivation of cotton in India is of the first importance, any hints which may tend towards its improvement will, I deem, be acceptable.

IX.

CULTIVATION OF INDIGO.

BY N. ALEXANDER, ESQ.

[READ 13TH AUGUST, 1829.]

There is no speculation on which the opinions of men in England, supposed to be conversant with the subject, more widely differ, than that of the "cultivation of Indigo, in Bengal*" By some it is considered the safest investment of mercantile capital; by others it is contended, that we are fast approaching the point where production will exceed consumption, and that then the speculation will be an unprofitable one. Those who en-

* The cultivation and manufacture of Indigo, as now practised in Bengal, were unknown to the natives of Hindostan; the present mode has been introduced by the enterprise of the English merchants, who, in a few years, have established a trade in this drug, which, from its extent and value, has become conspicuous in British Commerce. The value of Indigo to this country is immense. The cultivation of the weed from which this precious dye is extracted, covers a space of ground equal to about 12,00,000 acres; it gives subsistence to about 500,000 families, and the cultivation is carried on at an annual outlay of about 16,00,000£, and about 2,000,000 is invested in factories, stock, &c. It has occupied large tracts of land, which lying within the influence of the annual inundations of the Ganges, was unfit for any native cultivation, and has raised the value of land, in the districts where it is cultivated, at least 100 per cent.

tertain this latter view of the speculation, assert, that we possess the means of unlimited cultivation of Indigo in this country; and that we are annually increasing the quantity of our crops. The object of this paper is, to investigate the truth of this opinion, and to endeavour to show the actual state of the Indigo trade of this country, and how far the increased production is met by an increased consumption; for it is obvious, that if causes exist, which restrain the cultivation of Indigo, and that the average increase of production is equalled by a like increase of consumption, the speculation is in an equally flourishing state, whether the average crop be one hundred, or five hundred thousand maunds.

The opinion, that we are yearly extending our Indigo cultivation in Bengal, careless of the consequences, has gained considerable credit in England, and is founded on two propositions; first, that the high prices of Indigo, for the last six or seven years, have so enriched the Indigo planters, that they are no longer under the controul of the houses of agency, and that in consequence, each individual of that body will extend his own cultivation for his own advantage, without taking a general view of the effect such an increase of cultivation will have on the crop; the second proposition is, that any quantity of land, applicable for the cultivation of Indigo, is procurable in Bengal, and, therefore, putting these together, they deduce, that no limits can be assigned to the quantity of Indigo which will be produced.

The first of these propositions takes for granted, that we have the same Indigo planters in India that we had seven years ago; all now become wealthy and independent men from the large profits on the trade during that period; this, to commence with, is erroneous: we are all aware, that, during the last seven years, numbers have annually retired with their savings, and without continuing interested in the concerns they have left. This annual secession of the wealthy, leaves the body of the planters little changed; they have better prospects of realizing fortunes, but cannot be said, as far as this country is concerned, to be increasing in wealth; and most of them are still dependent on the houses of agency for support. But, even supposing this proposition to be true, and that the Indigo planters are wealthy, and not to be controuled by the houses of agency, nor likely to listen to their advice; still their own interests would soon hinder them from increasing the cultivation of Indigo, unless they found it profitable to do so on an extended scale; they must find land equally well suited with that which is already cultivat-

ed; for if they cannot, and are obliged to have recourse to poorer soils, the extent of cultivation must be regulated by high and low prices. If high prices tempt the planter to increase his cultivation on land not so productive as that occupied by his former more limited cultivation, low prices will again force him back within his own boundary. It is, however, taken for granted, by those who contend for the power we possess, of unlimited cultivation in Bengal, that all parts of the country are equally well adapted for the production of Indigo. Mr. Wilkinson, who takes this view of the speculation, in a paper published in London last year, states, "There is no question, that the means of "producing Indigo in India are unlimited; quite as regards any "ratio to the means of consumption in this quarter of the globe, "or the whole world, as things now are. The *new lands*, and "*these are in abundance*, are more productive *than those in* "*use*." Previous to entering into an investigation of these *data* on which the theory is based, it may be remarked, generally, that the cultivation of Indigo, in this country, will be found to be analogous to the cultivation of corn in England, during the time that prices have been so high. In both countries, high prices have tempted the cultivator to raise produce on poorer soils, and at an higher cost of production. Here, however, we have no law to keep up the price of Indigo to a certain standard; and when prices fall, the planter must give up his poor soil, as the farmer in England would do, were the corn laws repealed *. The question of the greatest importance in this investigation is, whether Mr. Wilkinson is correct in his assumption, that "The new lands, and these are in abundance, are more "productive than those in use?" Now, if we consider this extended cultivation to have commenced in 1823, we shall find the contrary to have been the case; and that the land occupied since that period, is not so productive as the land previously in cultivation, which consists of the *churs* in the river and its low banks, rendered fertile by annual deposit—the further we recede from the influence of the inundation, the less adapted is the

* Many also consider that the ryot, who cultivates Indigo, receives a very unequal share of its value, and give this as a further argument of our power of extending cultivation, by being more liberal in our advances to the ryot; but those who think so, only look to the large profits of particular factories, at particular seasons; if we take any average of years since the extended cultivation has taken place, and consider the certainty with which the ryot is paid, and the uncertainty of the returns to the planter, we will find that the ryot gets his fair share in most factories; indeed the fact of so many factories being unsuccessful, is of itself proof, that the competition arising from increased production has, in many parts of the country, increased the advance to the point which renders the speculation a bad one.

soil for the cultivation of Indigo, as will be perceived from the following analysis of the fertilizing principles of the Ganges' inundation, by Mr. Piddington, to prove that vegetable decomposition, in various stages, is not the fertilizing principle of the great tropical rivers. This gentleman states, "It is well known, "that while the tracts within reach of the inundation preserve "their original fertility, the higher soils are generally and rapid- "ly impoverishing, and this to a degree of which few, who "have not made the subject one of attention, are aware. There "are some crops which cannot be repeated on high soils, unless "at intervals of three or four years; while on the low lands, "these are the only ones which are, and have been, taken "for a period beyond the memory of man. Indigo is a strik- "ing instance, and the most familiar one, of what is here ad- "vanced; and it was with a view to some improvement in the "cultivation of this plant, that the following analysis was in- "stituted. Portions of the silt, or mud, deposited by the inun- "dations, were procured from Bansberria, near Sooksaugor, "and from Mohutpore, near Kishnagur, the analysis of each "gave, in two-hundred parts,

	"Silt from Bansberria.	*Silt from Mohutpore.*
"Water,	2	2
"Vegetable matter, destructible "by heat,	4¾	5½
"Saline matter, mostly Muriate "of Potass,	0¼	0½
"Carbonate of Lime,	12¼	16½
"Phosphate of Lime,	0	1
"Oxide of Iron,	12	12
"Silex,	156	139
"Alumina,	6¼	14¾
Total,	193¾	191¼
"Loss,	6¼	8¾
	200	200

"The very unlooked for circumstance of only 2½ per cent. of "vegetable matter being found in these specimens, appears "to exclude the idea, that this is the fertilizing principle, or, at "least, that it should be exclusively so; while on the other hand, "from 6 to 8 per cent. of calcareous matter appearing in them, "(when in an extensive series of experiments, on higher soils, "this was always found remarkably deficient, seldom more

" than 0·75 to 1 per cent.) points to the conclusion that the " calcareous matter was, perhaps, the great agent, and, in as far " as regards Indigo, this was found, by experiment, to be the " fact; for a minute portion of lime was found to increase the " produce upwards of 50 per cent."

By this analysis an important fact is obtained; namely, that the lands within the influence of the inundation, and which have long since been occupied for the cultivation of Indigo, are annually richly manured by a process which impoverishes the higher land, and that, consequently, as you advance the cultivation of the Indigo from the banks of the river, you must occupy land which will not yield you produce equal to that obtained in the soil renewed by the deposit from the annual inundation, unless you replace the fertilizing matter washed away, by manure *. In the present state of this country, this is not to be thought of: it could only be done by lime brought from a great distance, at an expense which, (if enough could be procured,) would, nevertheless, render the cultivation unprofitable, even at the high prices latterly obtained for Indigo. But admitting Mr. Wilkinson's position, so far as the fertility of the soil, and that no obstacle to increased cultivation arises from this, his further position, that new land is to be had in abundance, is quite erroneous. No man, who has been connected with Indigo factories, is ignorant how difficult it is to procure new land in Bengal; and that, if he has sufficient influence to obtain leases of land, he must displace dry crops, which yield a large profit, and must pay in proportion. Lower Bengal is far too populous to admit of tracts of land remaining uncultivated, and procurable by any person who chooses to occupy them †. But to return to

* Carbonic Acid Gas exists in the inundated soil, and acts as a powerful productive agent on the *churs* of the Ganges, and may be considered as partly operating with the new soil annually deposited in producing such fine Indigo.

† It may be said, that there are vast parts of land applicable for Indigo cultivation in the most eastern districts of Bengal, but these districts are at present overrun with forests and jungle, and are so scantily supplied with inhabitants, that it would require ages to bring them into general cultivation. The population even of that part of Bengal which is now occupied by Indigo, is too scanty for its manufacture, and the planters have supplied themselves with labourers from the hilly country between Burdwan and Nagpore. The people who inhabit this country are savages, living mostly in trees, who trust to hunting for their precarious subsistence. These now come down in bands of from 100 to 1000 under their sirdars, with their families, and contract with the planter for two or three years, who pays a monthly sum for each individual of the family, and provides them with huts; forming them into a colony. By this means, employment is given to a vast number of these hill-people, who will gradually introduce improvements into their own country, and convert their wastes of jungle into cultivated land, through the knowledge and wealth they have acquired during their sojourn in the plains of Bengal.

the question of the fertility of the soil occupied by the cultivation of Indigo, previous to 1824, and to that occupied by the increased cultivation since; on comparison, I find that the ratio of inequality in the amount of the annual crops, since 1824, is increasing faster than the increase of quantity, and consequently, (supposing the land occupied by the planter previous to 1824, to continue as fertile as before that period, which from the annual renewal of the soil by deposit, I consider it to be,) the risk to the planter of the lands cultivated for the increased crop, is considerably greater than to the planter of the land previously occupied. The amount of crops for the last ten years are,

The crop of	1819,	was	1,05,000
———	1820,	„	72,000
———	1821,	„	90,000
———	1822,	„	1,13,000
———	1823,	„	80,000
———	1824,	„	1,10,000
———	1825,	„	1,43,000
———	1826,	„	90,000
———	1827,	„	1,47,000
———	1828,	„	96,000

I divide these 10 seasons into two periods, of 5 years each; as it is generally considered, that in the season 1823-24 the spur to increased cultivation was given; and I may add, that, if over production of Indigo was ever likely to take place, the last 5 years was the period for it. In the first period of 5 years, the difference of crops annually were as follows:—

1820	the crop was	less than	in 1819,..33,000	maunds,
1821	ditto	greater than	in 1820,..18,000	„
1822	ditto	ditto	1821,..23,000	„
1823	ditto	less than	in 1822,..33,000	„

This gives the greatest difference between any two years, 33,000 maunds, and the average difference 27,000 maunds, in round numbers.

For the next period of five years, the difference of the crops annually were,

1824	the crop was	greater than	in 1823,..30,000	maunds
1825	ditto	ditto	1824,..33,000	„
1826	ditto	was less than	in 1825,..53,000	„
1827	ditto	was greater than	in 1826,..57,000	„
1828	ditto	was less than	in 1827,..53,000	„

The greatest difference between any two years in this period is 57,000 maunds, and the average difference 45,000 maunds.

By this comparison it would appear, that the uncertainty of production is increasing faster than the increase of production; for if we take the average of the crops from 1819 to 1823 to be 95,000 maunds, and the average difference of good and bad seasons to be 27,000 maunds, and the average of the crops for 1824 to 1828, to be 1,22,000 maunds, the average difference between good and bad seasons should be 33,000 maunds, thus:

95,000 : 27,000 : : 1,22,000 : 33,000

instead of 45,000, as already shown:—this increase may be considered to have arisen wholly from the lands occupied for the extended production of Indigo. Whilst the cultivation was restricted to the lands most applicable for that purpose, the difference between good and bad seasons did not amount to much more than one-fourth of the average crop: when the increase of production took place, the difference between good and bad seasons, on the annual average increase, amounts to nearly one-half of the crop: the difference being 45,000 instead of 33,000, leaves an excess of 12,000 maunds against the average increase of the annual crop, which is 27,000 maunds, or nearly one-half.

This being our situation here, we are not likely to extend the cultivation of Indigo much beyond the demand, but rather to check it the moment the stock in hand increases, and only to follow the demand, and extend our cultivation to meet increased consumption in Europe*. Since the year 1829, the average consumption is

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* Nothing can prove the increase of consumption, more than the following statement, drawn up by the houses of business in Calcutta, connected with Indigo factories, in the year 1812. It is a document worthy the attention of those, who contend that we are now extending the cultivation and production of Indigo beyond the quantity required for consumption, as they will find many of their own opinions and arguments in this paper:—

STATEMENT.

It appears by accounts, of the accuracy of which there can be no question, that there remained in the India House, on the 1st July, 1811, of Indigo 19,980 chests, and this quantity is exclusive of the extensive purchases made by speculators at the May sale, 1810, and the greater part of which remained in their hands for disposal at the date abovementioned; but in this statement it is only proposed to include what was in the India House.

	Factory maunds.
20,000 chests may be estimated to contain 60,000 or say.....	65,000
Of the crop of 1810 there was shipped, and of the arrival of nearly all of which we have accounts about..... 60,000	
But of which those formed part of the above 20,000 chests, about 5,000	
	55,000
Carried over,....	1,20,000

estimated at 95,000 maunds; but for the last 4 years the consumption has greatly increased, and fully keeps up with the in-

	Factory maunds.	
Brought over,....		1,20,000
Of the crop of 1811 there has been, or will be sent to London,.....		50,000
Of the crop of 1812, now on the ground, though it be stated, in some parts of the country, to be unpromising, yet the appearances generally are favourable, and the amount of it, notwithstanding the cultivation being somewhat reduced in the upper provinces, may fairly be estimated at maunds.....	75,000	
And of which there will probably go to the Persian Gulf and America.....	12,000	
		63,000
		2,33,000
The quantity cleared out from the India House, from 1st July, 1811, to 1st January last, according to the best estimate that can be made, did not exceed 6,000 chests, equal to		19,000
So that there are.....		2,14,000

to be cleared out from the India House, during the time that will elapse between the 1st January past, and the period when the crop of 1813 will arrive in London, and for which crop (1813) the planters of the adjacent districts, at least many of them, are now anxious to make advances. But before doing so, it would seem wise for them to attend to the above statement, and also to the following important truths:—

According to the best calculation, founded on the advices received during the past 12 months, not more than 30,000 maunds were consumed in, and exported from England in the course of the year 1811; at this rate, supposing it to continue, it is evident there will be Indigo enough at the end of this season, for upwards of 7 years, reckoning from 1st January past. It is an established fact, that an importation of 60,000 maunds into England is a full supply, in times of free intercourse between London and all the parts of the continent. It follows, that even had we universal peace, and unrestricted commerce, there are upwards of 3½ years' demand provided for, according to the data above specified. It also may here be remarked, the seasons 1810 and 1811 were generally considered unproductive, yet these seasons yielded as much Indigo as in any times there could be a demand for. It is, therefore, clear, that, (without reference to what is going forward on the Coast of Coromandel, and what may be expected from Java,) the cultivation is by far too much extended, for in a productive season enough would be manufactured for 2 years' demand. This extended cultivation has not only reduced, but would further reduce the value of the article—and it has also unquestionably, by occasioning competition between neighbouring factories, materially enhanced the expense of cultivation and manufacture, and thus it is, that a planter now seldom derives a fair compensation for his year's labour. The increased expense of cultivation and manufacture, particularly in the low districts, has, no doubt, been occasioned by the numerous factories of late years erected; and as growing out of the same evil, may be traced the system now followed, of making advances in July, instead of 6 or 7 months afterwards, as was the custom a few years ago. If all the planters cease making advances till the end of this year, or beginning of next, it follows that a considerable loss of interest will be saved to the planters, and the cry of ryots leaving one factory to go to another, cannot exist, when competition has ceased.

We, the undersigned, having considered the facts and argument set forth in the above statement, founded on authentic accounts, are decidedly of opinion, that it is the interest of all parties concerned in Indigo, that its cultivation should be very

crease of crops. On the 31st December, 1825, the stock on hand in London was 15,880 chests. I calculate, if no check to manufacturing industry takes place, that the stock on hand on 31st December, 1829, will not exceed 20,000 chests; (and if this is the case, then the stock on hand, on 31st December, 1829, will only exceed the stock on hand on 31st December, 1819, by 356 chests, or about 1,400 maunds, so that all the intermediate produce has been consumed.) But some suppose it will be as much as 24,000 chests †. Taking it at that quantity, the increase of stock will be about 8,000 chests, or 32,000 maunds, and the consumption of the four years will be the annual crops minus 32,000 maunds.

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materially reduced; and seeing the necessity, from the foregoing details of our acting in conformity with that opinion, it is alike our duty, and the interest of all parties, to promote a compliance with it, as far as in our power; and, therefore, think it right thus collectively to submit the subject and our sentiments thereon, in a particular manner to the good sense and serious consideration of our Indigo correspondents, whom we shall earnestly request to co-operate.

We are also of opinion, that the novel system of early advances to ryots, becoming, year after year, still more early, through the ill judged competition of neighbouring cultivators, is unwise, and must ultimately prove ruinous to themselves. And under this impression we should fail in our duty did we not earnestly recommend our respective constituents to withhold their advances until a more advanced stage of the season, as was universally customary only a few years ago.

And it is agreed, that copy of the above be sent to all our constituents interested therein.

Calcutta, 17th June, 1812.

(Signed) Cruttenden and Mackillop,
„ Alexander and Co.
„ Mackintosh, Fulton, and McClintock,
„ Johannes Sarkies and Co.
„ Palmer and Co.
„ Colvin, Bazett, and Co.
„ Hogue, Davidson, Robertson, and Co.
„ J. Scott and Co.
„ Fairlie, Fergusson, and Co.
„ Joseph Baretto and Co.
„ Mr. William Hollings,

E. E. True Copy,
(Signed) Cruttenden and McKillop.

† Should, however, the production of other countries exceed what I anticipate, and a stagnation of trade tend to accumulate a heavier stock, it must be shown that Bengal Indigo is accumulating in equal proportion to that of other countries, to prove that an over production, likely to be permanently injurious to the trade, has taken place.

1825	the amount of	crop was	1,42,000	maunds
1826	ditto	ditto	90,000	ditto
1827	ditto	ditto	1,47,000	ditto
1828	ditto	ditto	96,000	ditto
		Total, ..	4,75,000	maunds,

This gives 4,75,000—32,000=1,43,000, as the consumption of Bengal Indigo, for the four years, or 1,10,750 maunds annually; (if the stock be less than 24,000 chests, this average will, of course, be greater *.) During this period the average price of good Bengal Indigo may be quoted,

1826— 8*s.*

1827—11*s.*

1828— 7*s.* 6*d.*

1829—say 10*s.*

This gives an average price, for good Bengal Indigo, of 9*s.* 1*d.* and leaves, after the cost of production, ample profit for both the planter and merchant. No factory can be called a really good one, which cannot yield a profit when its produce is selling at 6*s.* per lb. in London; and all factories not producing within this limit, will depend on high prices for their existence: when good Indigo comes down to 7*s.* or 8*s.* per lb. the increase in deliveries takes off the accumulations of the annual surplus. In consequence of the reduction of price, during the last year, (1828,) the increase of deliveries in London, alone, was 5,000 chests, or 18,000 maunds †. I see no reason, therefore, for fearing that the cultivation of Indigo in Bengal will be overdone; on the contrary, I think that all concerned in the speculation are aware of the impediments which oppose its extension, and

* It should be kept in mind, that we have never yet had a succession of crops of Indigo in Bengal equal to the consumption of the world, and that we have the power of selling the whole of our crop without loss, at prices which would drive the Indigos of other countries out of the Europe markets. Should we even have a succession of crops, therefore, for the next 4 or 5 years, averaging 1,40,000 to 1,50,000 maunds, they will bring down prices no doubt, but will benefit the speculation of cultivating Indigo in Bengal in the long run, by clearing the market of all other Indigos. Until the production of Bengal exceeds the consumption of the world, no permanent injury can be done by what we now consider large crops.

† The present year, (1829,) will enable us to form an accurate idea of the consumption of Indigo. The general distress of the manufacturing classes in Europe, and the absence of speculation, will hinder sales, except for actual consumption; we may, therefore, fairly take the deliveries of the year 1829 as the minimum of Indigo consumption of the present day, and make our calculations accordingly.

that during the last five years they have increased the cultivation with an increased consumption, and not before it. I see no prospect of any increase in the quantity of Indigo annually produced in Bengal, unless we are tempted by increased consumption and enhanced prices; but a very visible change in the quality—the very inferior Indigos have disappeared, and the planters are generally turning their attention to the quality of their manufacture; this will have a very beneficial effect on the trade and stability of the speculation. It makes no difference to the country, whether one-half of the crop is sold at an average of 10 *s.* per lb. and the other half at 6 *s.* per lb. or the whole at 8 *s.* per lb. but it does to those engaged in the speculation, for it ensures them a market, and a certainty of having the preference.

The great increase in the production of Indigo in Madras, Java, Manilla, and South America, may, for a time, undoubtedly swell the stock at home, and lower the prices of Bengal Indigos; but I do not apprehend any permanent injury to our trade from this circumstance. If prices fall, Bengal alone can produce the drug at a profit; and, (if my data are correct,) in a limited degree, the production will decrease to its former average, and the stock will gradually diminish, as other countries will cease altogether making Indigo. I calculate on no decrease in the demand for Bengal Indigos, and we have a fair prospect, if peace continues, of a very considerable increase in the consumption of continental Europe. We possess the greatest of advantages in the cheapness of manufacture, and excellence of the quality of our Indigo; and to continue the prosperity of the trade, we have only to conduct it with prudence and forbearance, watching the state of the markets and amount of stock, and regulating the cultivation of each factory by the cost of its productive powers *.

* If the produce of Bengal is annually consumed, and the stock of Indigo in London, is made up of the produce of other countries, of inferior qualities; that stock, be it great or small, ought no more to interfere with Bengal Indigo, than a large stock of Bengal Cotton now influences the prices of American. The want of classification in the stock of Indigo in London, is decidedly prejudicial to the Bengal planter; and all parties interested in the trade, should join in using their united exertions, to have the stock separated, and the quantity and quality of the produce of each country placed under a separate head.

X.

DIRECTIONS FOR CULTIVATING TEAK.

The timber of this tree is, in India, what oak is in England; it is, however, unnecessary to enlarge on their comparative value, because oak will not grow in this country. Our attention ought, therefore, to be confined to teak alone, not only as being by far the best wood we have in this country, for ship-building, but also for the house carpenter, and almost every other work, where strong, durable, easily wrought, light wood is required. The cultivation of so valuable a tree, where nature has not bestowed it, must, therefore, be obvious to every one, particularly in Bengal, where it grows well, and the demand is so great.

Government, sensible of what is here stated, have long given every possible encouragement for an extensive propagation, but to render it still more general, the native land-holders must be made sensible of the advantages they may expect to derive from large plantations.

The growth of the tree is rapid; and, at all ages, the wood, (from various experiments,) appears excellent; some trees in the Hon'ble Company's Botanic Garden, brought from the Rajamundry Circar, in 1787, are now, (1804,) from 3 to upwards of four feet in girt, at 3 and ½ feet above ground, and high in proportion.

These plants * were about twelve months old, when sent from the coast, so that their present age is about 17 years. A tree promising so much advantage, in so short a space, compared to what the oak requires in England, to become serviceable in the marine yard, makes it highly worthy of every attention and encouragement. A few observations on rearing the plants from the seed seem necessary, as I have often known seeds from the same tree succeed with one person, and totally fail with another.

The nut in which the seeds are lodged is exceedingly hard; contains 4 cells; in each is lodged a single small seed.—It has

* The largest of those trees, measured at 3½ feet above the ground, was, in February, 1796, 42 inches in circumference; the same tree is now, (February 1804,) 52 inches in circumference at the same place, which gives an annual increase of one inch and a quarter; however, while the trees are younger or in a more favorable soil than where this tree stands, their yearly growth is from 2 to 3 inches, which is fully double the increase of oak in England.

been ascertained, that they perfectly retain their vegetating power in the ground, even as far as eighteen months; however, it is adviseable to sow them about the beginning of the first periodical rains, or north-westers, after they are taken ripe from the tree, in October. If sown about this period, (or rather before than after,) in well shaded beds, about an inch asunder, and covered with about a quarter of an inch of earth, with a little rotten straw or grass spread over the earth, to keep the earth in a constant state of humidity by gentle waterings, should the weather prove dry, most of the nuts will be found to produce from one to four plants, in from four to eight weeks. However, it sometimes happen, that many will remain in the ground until the commencement of the second rains—nay, even the third, from the time they were sown; however, this is rare; yet it will be adviseable to sow the seed on a spot that can be spared, at least until the rains of the second season are well advanced: by not attending to this circumstance, many have thought the seed bad, and consequently caused the ground to be dug up for other purposes.

The plants, when they first make their appearance, are very small, scarce so large as a cabbage plant when it first springs from the earth; their growth, however, is rapid. When they are about one or two inches high they ought to be transplanted into other beds, at the distance of about six inches from each other, there to remain until the beginning of next year's rains, when they are to be planted out where they are to remain: or they may, when from two to four inches high, be planted out at once to where they are to grow, and it is not perfectly clear, but by doing so they succeed better; as in taking up plants of any considerable size, say from one to two or more feet high, the roots are very apt to be injured, particularly, the tap root, which retard their growth much,—nay, often kills them.

About Calcutta, they thrive luxuriantly in most places where they have been tried and any tolerable degree of care taken of them; so that the only observation which seems necessary to be made on this head, is, to avoid sowing the seed, or planting on such places as are low, or subject to be inundated, and to keep them clear of weeds, and sparingly watered, during the dry weather, for the first year only. In a good soil, not much over-run with that coarse, white-flowered grass, called, by the natives, Oloo, (Saccharum Cylindricum,) they will scarce require any care whatever after the first six months from the time of being planted out, where they are to stand. They will then be about 18 months old, supposing them to have been transplanted twice, and in that time they will, in general, be from five to ten

feet high, according as the soil is favorable, and out of all danger, except from north-westers.

With respect to the distance at which the plants ought to stand in plantations, every one's judgment can direct. The oak requires a great space, as the crooked parts are most valuable, and required for the knees and other curved timber in ship-building; but teak is naturally a straight grained tree, and only used in Bengal, or at least, in general, for the straight work; Sissoo being generally employed for knees and other crooked timbers; hence it may be concluded, that the straighter the teak trees grow, the more eligible for every purpose. This timber is generally employed in Bengal; they do not, therefore, require to be planted at a great distance,—suppose from six to ten feet quincunx order; by being so close they grow straighter, and protect one another while young, which is particularly wanted where violent gusts of wind, (such as our north-westers,) prevail. When the trees grow up, they can be thinned out to advantage, as the timber of the young trees will answer for a variety of uses. The seed of this tree we have now in such abundance, as to render a few hundred plants in the hundred biggahs of little or no importance; and if the ground on which they are planted is not of the best sort, the more necessity is there for planting close.

Suppose the trees planted in quincunx order, ten feet asunder, a Bengal biggah, (which, I believe, is generally reckoned a square of 120 feet,) will hold about 144 trees.

It will be necessary, during the first ten years, to cut down about half of them, to give the rest more room, and then they are worth one rupee each.

Again, at from ten to twenty years, reckon half of the remaining number to be cut down, to make still more room for the rest, and to be worth 4 rupees each.

And again, at from twenty to twenty-five years, it may be necessary to thin them still more;—say to another half, (or one-eighth of the original number,) and to be worth eight rupees each. The remaining few trees may be expected to have, on an average, shafts or trunks 30 feet long, and at least four in circumference, which gives, according to the basis of timber-merchant's measurement, a girt, or square of twelve inches; the dimensions of such a piece of timber will, therefore, be 30 cubical feet, or three quarters of a ton, which at one rupee per cubical foot, the average price of Pegue teak in this place,

(Calcutta,) for some time past, will amount to 30 rupees per tree. Nor is it likely that the price of this indispensable commodity will fall; our growing trade, and consequent increase of shipping, gives reason to think it will rather rise in price; let us, however, be on the safe side, and say, that each of the last mentioned 42 trees, will be worth only 20 rupees each.

From the above statement, a biggah of land, planted with teak trees, will produce, during thirty years, as follows:—

In the first ten years 170 are cut, and reckoned to be worth one rupee each, is.....	Sa. Rs.	170
In the next ten years 85 more are cut, and worth 4 rupees each,.....	„	340
In the next following 5 years 43 more are cut, and worth 8 rupees each, ...	„	344
At the end of 30 years the remaining 42 trees are reckoned to be worth 20 rupees each,.....	„	840
Total produce of a biggah, at the end of 30 years, Sa. Rs.		1,694

Independent of the branches, and many of the largest will be fit for knees, and other crooked timbers of small dimensions, consequently of considerable value.

From the above sum 1,694 Rs. is to be deducted the rent of the land for the above stated time, together with the expense of planting, hedging, and taking care of the young plants during the first few years; after that, they will require little or no care.

The former, let us suppose to be 3 rupees the biggah, which is certainly a high rent, and will amount in 30 years to.....	Sa. Rs.	90
Charges of planting and hedging, say.....	„	20
Wages of one man for first 5 years, at 36 Rs. yearly.....	„	180
For the next 25 years allow one man to 3 biggahs, is for one biggah 12 Rs. or for 25 years....	„	300
Total charges of one biggah, for thirty years, Rupees.		590

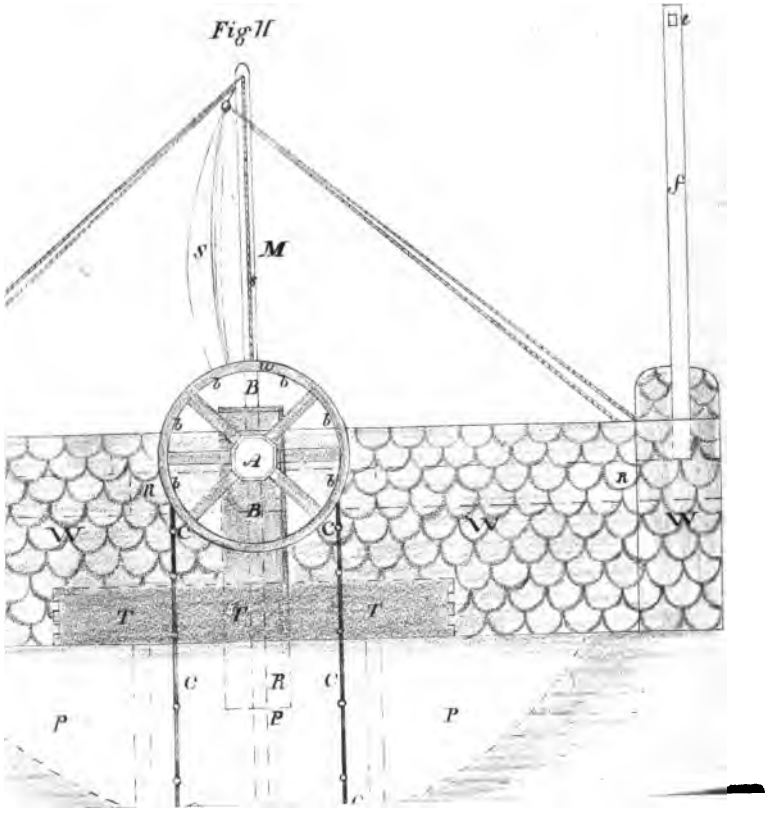
Potatoes, Leguminous and Cucurbitaceous plants, all meliorating crops, may, with advantage to the plantation *, be reared in constant succession, on the same ground, during the first two or three years, or until the tops of the trees are too large to admit of their growth; the produce will help to defray the expense of labouring the ground, during that period; afterwards, as above observed, little more will be required than keeping up a fence round the plantation, to keep cattle and idle people from hurting the trees, till they are so large as to be out of all danger.

A period of thirty years is only brought into the above calculation, though it may well be imagined, that, when in a healthy state, they must continue to gain considerably, both in size and quality, for a much longer period. In the Bath papers on Agriculture and planting, Vol. VII. Article 1st, letter the fourth, a single oak tree is traced to have taken 75 years in acquiring a single ton; whereas, in another 75 years, the same tree gave seven times as much in quantity, besides the increase in value, as naval timber.

In addition to the foregoing remarks may be proper to add the following extract of a letter from Thomas Barnett, Esq. to G. H. Barlow, Esq. Chief Secretary to the Government, dated the 8th of November, 1799.

"A few years ago, a number of teak tree plants were, by "orders of Government, I believe, disseminated in different "parts of the country for the propagation of teak timber; "amongst others, a few plants were sent to Rampore Bauleah; "this was in 1795; these plants have throve in a surprising "manner, and are, at this time, between 20 and 30 feet high, and "near a foot in diameter; the wood, of the hardest kind, and "as far as can be judged at present, greatly superior to the "teak of Pegue."

* About six years ago my gardener trenched a piece of useless ground behind some cottages, and planted it with refuse elm suckers; thus prepared, the poor people availed themselves of the circumstance, set the ground with beans and potatoes, and have continued to crop it ever since; this has been of service to them, and of infinite benefit to the trees, which, by means of this annual culture, have far outstripped their undisturbed brethren, and almost double their contents. —Bath papers, vol. VI. page 17.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XI.

ON A

NEW WIND MILL

FOR RAISING WATER.

BY D. SCOTT, Esq.

I beg to submit to the Agricultural Society, a description of a wind mill for raising water, of which a model was presented to you by Lieut. Fendall.

This machine appears to me to be well adapted for the above purpose in this country, where the direction of the wind, at some seasons of the year, can be calculated upon within a point of the compass, and more particularly during the hot-winds, when irrigation is so much required.

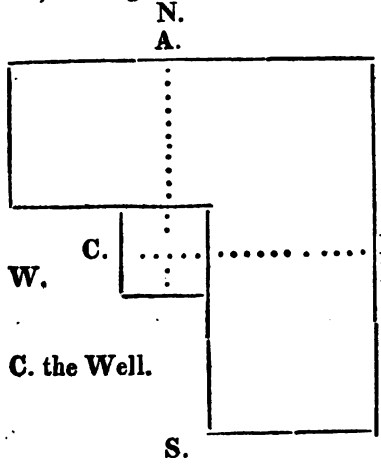
The mill is exhibited in the model in its most simple form, purposely divested of all such improvements as might enhance the cost so much as to place it beyond the means of the middling class of cultivators, in the Upper Provinces, and it is consequently subject to several obvious imperfections that might be remedied at some additional expense.

The wooden box represents a pit dug in the ground, or a skreen composed of four mud walls, or a combination of those two means of sheltering the lower half of the mill from the action of the wind when the upper half is exposed to it. This skreen must be erected in the direction from which the wind usually blows at the season when water is required; and supposing this to be east and west, the mill will go when the wind blows within one and a half points to the north or south of west; and it will also revolve in the opposite direction when it blows within the same distance of east, the buckets on the endless chain, being made double, so as to raise the water on either side of the Persian wheel.

The power of a mill, upon the same principle, but of which the axle was placed vertically instead of horizontally, with sails 18 feet by 14, was found to be equal, in the hot winds, to from 3 to 6 oxen; but as it worked a greater number of hours than any set of cattle, it might, at that season, be considered as fully equal to 8.

The size which I would recommend for the native cultivators is about 15 feet by 13 for the sails; and supposing the skreen to be a mud wall and pit, and the sails to be made of the ordinary coarse stuff used in the country boats, I should think that a machine of such dimensions might be erected in most places for about 30 rupees.

P. S.—It is probable that, by trimming the sails, the mill may act, although to some disadvantage, with a wind varying from the direction of the skreen as much as two points on each side; and by making the skreen of the shape described in the margin, and occasionally removing one end of the axle from A. to B. the machine would act with a wind from 16 points of the compass; that is, supposing it to blow within two points on either side of E, W, N, and South, or any other position in which local circumstances might render it more advisable to build the skreens.



XII.

REMARKS ON THE

CULTURE OF COTTON, IN THE UNITED STATES OF AMERICA,

FROM CAPT. BASIL HALL'S TRAVELS,

Communicated to the Society, by order of Government,

[READ 9TH DEC. 1829.]

The preparation of cotton-land requires most particular attention; it must be repeatedly ploughed, and frequently harrowed, say twice or thrice, until it is fully pulverised. Drils 4 feet apart,—in some instances 3, are then made with a plough, into which, if the soil be poor, old, well rotted stable manure is placed:—and at a distance of 1½ to 2 feet, a hole, not exceed-

ing 1 inch to 1½ in depth, is made with a hoe, and a handful of seed dropped therein, which must be immediately covered with the soil. The planting generally takes place between the 20th April and 10th May;—the earlier the better, that the cotton may be matured before the appearance of the autumnal frosts. The richer the soil the larger and better the crop, as with every vegetable. When the plants are about 1 inch above ground, they are thinned with the hand, leaving 4 only: at a later period, and when all danger from insects, &c. is well over, they are again thinned, and 2 only are left to bear. From these, by hoeing or ploughing, the weeds must be kept clear, until the buds are perfectly ripe and begin to open, which occurs during September and October: as they expand freely, the cotton must, by hand, be picked clean from the bowl*, and being a little damp, exposed, for a day or two, in a dry situation, to the rays of the sun. The quality of the cotton first picked, is always the cleanest and best. To save trouble it is customary with some planters to defer picking out any of the crop till the whole of the bowls be ripe, and have expanded, and become dry, by the influence of frost or cold weather. This plan is to be deprecated, for the bowls opening most irregularly, those first expanded are left to be injured by rains, dews, and decayed leaves, &c. When the crop is picked from the bowls, it is spread over the floor of a room, (should the cotton be damp,) till it is dry, and is then sent to the gin, where the seed is extracted from the fibre.

During the first week in August, some planters, where the crop is not too extensive, top each plant to the first eye, leaving only 6 branches to bear. This increases the quantity and quality, but forces the plant to throw out suckers, which are most difficult to be kept under.

Stiff, clayey soils require more seed than light, sandy ones; the plant being very delicate, requires the united efforts of several shoots to force its way through the surface, which often becomes packed and hard. Where seed is abundant, a large handful should always be sown in each hole; where it is scarce, and the land light, a smaller quantity may suffice: 200 English acres would require from 800 to 1000 bushels of seed cotton.

An acre will produce from 1600 to 2000 pounds of seed cotton, (i. e. with the seed,) or 400 to 500 pounds clean or ginned cotton—but this is a large yield; generally, on average soils, from 12 to 1600 pounds of seed cotton, are produced to the acre. A bale of cotton weighs from 350 to 400 pounds.

* Bowl. The dried capsule, or pod of the cotton.

XIII.

ON THE

CULTURE OF TOBACCO IN VIRGINIA,

FROM CAPT. BASIL HALL'S TRAVELS,

Communicated to the Society by order of Government.

[READ 9TH DECEMBER, 1829.]

I yesterday received your letter of the 24th instant, to which I take pleasure in immediately replying. 50 pounds weight, or 2 bushels of tobacco seed, would be sufficient to plant the whole state of Virginia;—some say a surface equal in extent to the United States; and that quantity cannot, by any possibility, be procured at this season; indeed, it will be out of my power to obtain any quantity of value to you; but I have spoken to several of my friends in this place who grow crops of tobacco, and have requested them to instruct their overseers to leave as many plants as possible to run into seed, which they have promised to do; and I shall write to all my acquaintances in the country to do the same, and prevail upon their neighbours to save as much as they can. The seed is never gathered, — indeed is not ready, till the fall of the year; and no planter keeps on hand more than what is requisite for his own use.

Respecting the culture of tobacco, I shall communicate the process adopted throughout Virginia; premising that success depends upon soil, situation, climate, and season,—new ground, or virgin soil, produces the best description. Plant beds, for the reception of seed, are prepared in the fall, in rather a moist situation, of pure vegetable mould, minutely pulverised, entirely freed from weeds; having the surface completely scorched by burning brush-wood, or shavings of wood, upon it. The seed is sown much after the manner of cabbage seed, about as thickly and as deeply, and raked in; this is done during the month of February. Early in May, according to the season, or during that month, the plants are removed to the field, and are placed out on hills, raised above the surrounding surface from 8 to 12 inches, at distances varying according to the strength of the soil, from 3 by 4, to 4 by 5 feet. Thus the rows are 4 feet apart, as with Indian corn, and the hills in the row 3 feet distant from each other.

The plants are allowed to stand unmolested till they begin to throw out suckers, which must be carefully removed by hand, as often as they appear. By hoeing and ploughing all weeds

must be kept under, as with corn or cabbages in a garden. When the plant has thrown out 8 or 12 well-sized leaves, according to the strength or richness of the soil, it must be topped; by which is meant, if the ground be rich, 12 leaves may be left,—if poor, only 6 or 8: the best way is to leave only 6 to 10. The plants being kept free from worms or caterpillars, which prey upon them, are left to stand till they are perfectly ripe; this is determined by the thickness of the leaf, and the crackling sound produced by breaking it. They are then cut with a knife, and placed upon poles horizontally, exposed to the sun for several days, till they die, and become of a yellow or brownish hue,—care, meantime, being taken, that they be not exposed to rains, or very heavy dews. From the field, hanging on the same poles, they are removed into log-houses, and hung upon the roofs. Under them, during wet weather, slight fires are kept up, the smoke ascending, from which dries the stem, and prevents mould. After hanging thus for 3 or 4 weeks, the plants are, when in a very dry state, taken from the poles, and are carefully packed on the dry floor, and covered with straw, to guard them from frost. If the winter be very wet, they are several times hung up, and dried partially with the smoke of wood fires, and replaced in bulk. Finally, in the month of May the plants are all hung up, and allowed to remain till a tolerably warm and moist day, when they are taken down, and the leaves being stript from the stalks, and tied up in bundles of 6 and 7 leaves each, with a leaf binding them together, and are thus packed carefully into hogsheads—12 to 1500 pounds are put into each hogshead—the butt ends of the tobacco touching the cask, and the points directed inwards to the centre.

Smoking is injurious; and if the season be sufficiently dry and warm, it is better to cure the tobacco entirely by the aid of the sun.

XIV.

Remarks on the best method of

CULTIVATING NEW ORLEANS COTTON,

FROM CAPT. BASIL HALL'S TRAVELS,

Communicated to the Society by order of Government.

[READ 9TH DECEMBER, 1829.]

The cultivation is simple and easily understood, so that a few general directions will suffice to describe our manner of pre-

paring a cotton field, and the care and attention requisite to keep it free from weeds and grass.

1st. As to the most suitable soil for growing fine cotton, I should prefer that which is rich, light, and dry; but it is generally thought, that *new* land does not produce as fine a *quality* of cotton, as that which has borne one or two crops of grain previously. The situation should be such, that there is no danger of an overflow of water, which would seriously injure the plant. In preparing the ground we use only the plough, and lay off the rows from four to six feet, and where the soil is as rich as the alluvion of the low grounds on the Mississippi, even eight feet is not too much. We open the ridges by running a narrow drill, by plough or otherwise, and sow the seed in it as we would grain, covering it lightly with a harrow. The plant, on its first appearance, and for some weeks, is extremely delicate, and easily injured by careless working. The rows, at first thickly covered with plants, must, in about ten days, be thinned out, so as to leave the stalks single, at the distance of eleven inches or a foot from each other; or, as some of the plants may be lost or destroyed, we generally leave two or three together; but in about two weeks more, at furthest, they must be reduced to one, as experience has proved, that the plants will not flourish if at all crowded. While thinning the rows great care must be taken to clear them of all grass and weeds; in the early age of the cotton this is done with the hoe; in a short time after, to facilitate the work, we use ploughs between the rows, where every thing must be kept down, and not a blade of grass should be suffered to grow. Indeed, to obtain a good crop of cotton, strict attention is required to this rule, not to suffer any thing to grow among the plants until it is fully matured.

The time of planting, or rather sowing, our cotton, varies according to the season; generally we begin from the first of April to the fifteenth.—As a rule, I would say as soon as there is no danger of frost.

These general observations I trust will be sufficient; indeed it is impossible to fail in obtaining a cotton crop, provided the ground be kept perfectly clean, and the plants be not crowded. The quality of the cotton depends more, perhaps, upon care and attention in gathering and drying it, than upon the culture of the plant.

From the first of September, or sooner, the bells begin to mature and open successively until winter has stopped the vegetation of the plant. As soon as the bell has completely

opened; the cotton, which then hangs partly out of its shell, and has become almost dry, must be gathered by hand; care must be taken by the gatherer, (*or picker*, as we call the labourer,) to take hold with his fingers of all the different locks of the cotton, so that the whole may come out at once, and without breaking off any of the dry leaves about the bell. If any dry leaves fall upon the cotton before the gatherer has secured his handful in the bag which hangs at his side, they must carefully be taken off. It is necessary to use a close bag to gather the cotton, as the plant, though still flourishing, has on it many dead and dry leaves, which are easily shaken down; and it is this admixture of leaves which is objected to so much by the spinner, and will always lower the quality and price of cotton. After gathering the cotton, it should, as soon as possible, be exposed to the sun, on scaffolds, and thoroughly dried; and if not immediately ginned and packed, it must be stored in secure barns.

I deem it useless to enter into a description of our gins and presses, as they are manufactured and well understood in England. I shall only observe, that a cylinder of sixty rags ought not to make more than 600 or 800 pounds of clean cotton in 12 hours—if made to run faster, the cotton would not be so clean, and the fibres might often be broken or cut by the too rapid motion of the rags.

XV.

EXTRACT FROM CAPT. BASIL HALL'S TRAVELS IN NORTH AMERICA,

REGARDING THE CULTIVATION OF COTTON.

Communicated to the Society, by Order of Government.

[READ 9TH DECEMBER, 1829.]

Vol. 3. Page 217.

Every body must have read in the newspapers, under the head of Liverpool News, some mystical notices about "Uplands" and "Sea Island," and I now, for the first time, learnt how to interpret these hieroglyphics.

On looking at the map of America, abreast of Georgia a number of islands will be observed, such as Tybee, Ossabow, Sapelo, and St. Simons'; these make no great show on paper, but they are very important in commerce, as being the spots on

which the finest kind of cotton is raised. In strictness, what is called technically "Sea Island Cotton," is not confined to these insular districts, but grows at various places on the main coast, and also for some distance from the sea, in the swampy regions bordering on most of the great rivers. The term is now used, therefore, to describe a particular sort of cotton, the esential characteristic of which is the length of fibre, or staple, in contradistinction to the less valuable kind, with a short staple, which, from growing further from the sea, at a higher level, has acquired the name of "Upland Cotton," or, in the brevity of commercial language, 'Uplands.'

Various motives attracted us to St. Simon's Island, and we certainly were well repaid for the little round of a couple of hundred miles, which it cost us;—one wears seven-league boots in America.

The process of raising the cotton and preparing it afterwards, and, incidentally, the internal discipline of a well managed property, of course engaged our attention; as we had also the advantage of consulting persons of long experience, and perfect fairness, the following sketch will probably be found correct:—

On a sea-island plantation which I visited there were 122 slaves employed in the culture of cotton; of these, 70 were men and women between the ages of fourteen and fifty, 48 children under the age of fourteen, and 4 superannuated; the 70 workers were classed as follows:

39 Of them were called full hands,
16 Three-quarter hands,
11 Half hands,
4 Quarter hands,

making in all, out of the 70 persons, 57½ taskable hands. Those actually in the field were 44 taskables, while the remaining 13½ were employed as cart drivers, nurses, cooks for the negroes, carpenters, gardeners, house servants, and stock minders—what we should call in Scotland herds; in England, I believe, herdsmen.

The ground under tillage consisted of 200 acres of cotton, and 25 of India corn, potatoes, and other things of that description. This gave about 5 acres to a full hand in the field. Several ploughs were occasionally used, the ploughmen being included in the 44 field hands.

The fields are divided by temporary stakes, into square patches of 105 feet each way, equal to a 1¼ of an acre. These

portions which are called 'tasks,' are laid off in ridges or beds, five feet apart, on which the cotton is to be planted. When land has been thus previously bedded, the first operation in spring, is to hoe down the weeds and grass from the beds, into the furrows between them. This is what is called 'listing:' a full hand lists half an acre per day. The next operation is with the plough throwing up two furrows on each side of the list, which forms a ridge. The people then follow with the hoe and finish off the bed. Here, as the work is light, the task or portion of ground staked off is three quarters of an acre.

Two hands then proceed to open holes on the top of the beds, cross-wise, 18 inches apart, and of the width of the hoe. Another hand follows and scatters about 50 seeds in each hole, while two hands come after to cover them up to the depth of an inch and a half, patting the soil down.

The planting is scarcely finished before hoeing is required, as the weeds and grass spring up very fast. The 'task,' during this stage of the business, is half an acre. It is necessary to hoe the cotton about once a fortnight. At the second hoeing the cotton plants are thinned out till only about seven of every group remain; each one as far apart as possible from another. On the third hoeing a further thinning takes place amongst the plants, when one or two only are left, the cotton being left thickest on poor lands.

In September, or perhaps earlier, the cotton begins to open in 'good blow,' at which stage it is fit for gathering; one hand picks from 90 to 100 pounds of what is called seed cotton, from the seeds being still in it.

A woman generally performs about twice as much of this kind of work as a man can do. After gathering it into the barns it has to be assorted according to its quality. This also is generally done by women, assisted by those men who happen to be on the invalid list, or who, from age, are incapable of heavy labour. The different kinds of cotton are, first quality "white;" —second quality "white"; and "yellow."

It is a very troublesome job to get rid of the seeds, in consequence of their being so closely enveloped in the cotton; they form nearly two-thirds of the weight of the whole.

The process of cleaning is commenced by carrying it into the open air and allowing it to dry in the sun, which is necessary in all cases before taking it to the 'gin-house,' where the seeds are separated from the cotton by machinery. The ingenious apparatus, called the cotton gin, is the invention of an Ameri-

(Wrong,) Whitney's gin has no wooden rollers: the old American gin, (superseded by Whitney's,) had two wooden rollers. This the East India Company sent to India several years ago.

can of the name of *Whitney;* it consists of *two little wooden rollers, each about as thick as a man's thumb, placed horizontally,* and touching each other. On these being put into rapid motion, handfuls of the cotton are cast upon them, which, of course, are immediately sucked in. But, there being no room for the seeds to pass, they are left behind, while the cotton is delivered clean on the other side of the rollers. It is obvious however, that the mere motion of the rollers during this sucking-in process, would not alone be sufficient to detach the seeds from the fibres of cotton in which they are wrapped up. In order to loosen them a sort of comb, fitted with iron teeth, each of which is a couple of inches in length, and 7-8th of an inch distant from its neighbour, is made to wag up and down with considerable velocity, in front of the rollers; this negged comb, which is equal in length to the rollers, lies parallel to them, with the sharp ends of its teeth almost in contact with them. By the quick, wagging motion given to this comb by the machinery, the buds of cotton cast upon the rollers are torn open just as they are about to be sucked in. These seeds now released from the coating which had encircled them, fly off like sparks to the right and left, while the cotton itself passes through between the rollers.

In spite of all this tugging and teasing, however, certain seeds, or portions of seeds, more obstinate than the rest, do contrive to insinuate themselves between the rollers, and to pass along in company with the cotton, getting, of course, well crushed for their pains. I observed that the tips or sharp ends of the teeth of the iron comb sometimes gave the seeds a tap which broke them in pieces, and allowed the fragments to be drawn forward along with the cotton. These stray particles are afterwards separated by hand—a process which is called moting. One hand can mote from twenty to thirty pounds per day. The smaller bits of the seeds which may still remain, are afterwards blown away, when the cotton is whisked about in a light wheel through which a current of air is made to pass. On its being gathered up, when tossed out of this winnowing machine, it is carried to the packing-house, where, by means of screws, it is forced into bags of 300 pounds each. These are sewed up and sent to the sea coast, where they undergo a second squeezing, which reduces them to half their original size by a process I shall have occasion to describe at Mobile and New Orleans, after which they are ready for being shipped as the cotton of commerce.

XVI.

ON THE CULTIVATION OF COTTON AND TOBACCO IN CENTRAL INDIA.

By Baboo Radhakunt Deb.

[*Read 11th November*, 1830.]

Having made some enquiries into the method of cultivating Cotton in the Central Districts of Hindoostan, the following is what I have been able to collect from those who have had some experience in this branch of culture *in India*, and it will I trust, indicate the general principles on which the study of the subject may be pursued in comparison with the foreign Cottons. The Siam silky Cottons, and those of America and the West Indies are celebrated; but as India has had but a limited share of science for many centuries, it is not improbable that European experience will much contribute to the improvement, not only of the species by foreign introductions, but by its wonted sagacity, the methods of culture; taking so much from the native process adopted in this country as will serve the objects of science.

In the Central Provinces the more approved kind is called "Banga" which gives three sorts, the 1st called Bhagella, 2d Bhochurry, and the 3d the Pokhy—all these grow on fields within the proximity of villages, or on high ground—the nature of the soil must be sweet to the taste. I must observe here that connoisseurs make it a practice to *taste* the soils so as to distinguish that which has the saccharine quality, free from the mixture of saline or nitrous, or even chalky or insipid soil, the first of these are best suited to the culture of the best Indian Cotton—and so might you distinguish by other modes of analysis (the chemical being the European mode, not perhaps the least in preference) as to the peculiarity of soils producing different Cottons in other countries—tasting the earth being nevertheless one of the tests of local distinction here.

You will perceive a further peculiarity in the mode of reckoning the periods of culture by what follows. In fact all our labors on the soil follow the ancient mode of distinguishing seasons by the solar transits, or by the sun's entering the various signs of the Zodiac; a further mode consists in distinguishing the changes which are most commonly influential within every twelve years, or those attributed to the revolution of the planet Jupiter, which is also known to operate upon the seasons; however too much minuteness in this respect would be

exceeding the ordinary purposes of investigation, since none of us can ever be sufficient philosophers to mark the infinitude of nature's operations; and perhaps it is quite to the purpose to dwell upon the external evidences of her progress, by those means which are simple and feasible to the common capacity —but to proceed.

Culture.—In the month of Assur, or when the sun enters the sign of Gemini, a quantity of seeds is intermixed with cow-dung and exposed to the solar rays to dry; when moderately dried, they are sown upon a light soil kept in preparation for the purpose, and free from weeds. They soon give shoots which run up to the height of a span; the soil is then opened and weeded with a small instrument called *niranee.** In the month of Maug when the sun enters the sign of Capricornus, the plants will have risen to maturity; in this month, the ground is dug up with hoes or ploughed, and as numerous small scions are formed on the plants they are to be plucked off, which expedient directs the sap to the productive branches and gives a better crop. In the month of Choyte, when the sun enters Pisces the pods are formed and are allowed to become fully ripe, and having at this period a gradual increasing solar heat, they burst and exhibit the wool in the fulness of bloom. The gathering continues until the month of Joistee.

Dressing.—The Cotton is then threshed with an instrument in the form of a double reel, which winds adversely and throws out the seeds. It is then worked with a wired instrument called "dhuvee" which fits it for sale.

Seeds.—The seeds are given to cattle fatten them. An oil is also extracted from them which serves for lamps.

Refuse Plants.—The plants are lastly rooted up, and are dried for fuel and other purposes, such as fences for huts, &c.

Crops.—The produce may be estimated at about one maund of Cotton in each beegah of the first crop, which, including the weight of seed averages six maunds gross weight per beegah. With the same lands the second crop yields about half of the first, the third crop about one fourth.—Seeds in the same reduced proportion.

The price of the first sort is ten rupees per maund in the interior of the country, of the second sort eight rupees, and the third sort six rupees per maund.

The species called Bhogella yields two crops. After gathering the first year, the stems of the plants are cut away about three

* The native weeding hook.

or four inches above ground, these in the next rainy season, throw out new shoots, which are treated in the same manner as the first until the gathering. The other two sorts give only one crop, and then the plants must be removed.

In the Western Provinces where the produce is more abundant from the peculiar adoption of the soil and climate, the wool is gathered in the months of Bhadra, Assin, and Kartic.

Constant rains, or even too much moisture in the soil, are unfavourable to the growth of Cotton, in such cases, the plants are destroyed by a species of vermin, which stint them and prevent their coming to perfection, the same effects result from soils which contain saline moisture, or a superabundance of putrescent matter—heavy dews or frost are also unfavourable, though light dews must tend by their evaporating quality, to refine the threads and give them a downy cast. The rates of produce are generally considerable, but the prices in India vary but slightly.

TOBACCO.

The soil should be elevated above the level of moisture and sweet to the taste, such soil in Behar and the central Provinces is termed Dehae.

The ground is prepared for a whole year by ploughing twice a month, during the full and change of the moon. When the sun enters Libra the preparations are to be commenced—the advantage consists in making the soil light by being frequently kept free from clotted masses. It is therefore to be well opened and harrowed so as to imbibe the heavy dews which fall during the four following or winter months, and during the next four, or spring months, to be invigorated by the replenishing warmth of the solar rays, when, being one grade below the vegetating power, the rains complete this part of the process by their natural tendency to improve the vegetative principle. No other kind of crop, such as grain is to be sown during this preparation—the soil is to be also constantly weeded. Cow or buffalow dung, and ashes to be mixed with it in moderate quantities to render it rich for production.

Assin, or when the sun enters the sign of Virgo, is the proper season for sowing after the ground is made of a mealy consistency or granulated, which serves to yield a large produce. In the month of Assar the seeds are to be sown within a small space; as soon as the plants shoot forth and rise about three inches above ground, they are to be removed and transplanted about a cubit apart from each other, after this the ground must

be repeatedly kept free from weeds. When the sun enters Capricornus the leaves begin to ripen—the first throw of leaves being generally inferior they are to be plucked off and laid aside, those which succeed are allowed to attain maturity, and, when fully ripe, are broken off and laid on the plantation soil to imbibe the dews and solar heat, and improve there in fragrance—they are then packed up with layers of a grass called "Kuthra and Dabee"—in packing, the stalks must be carefully taken away, they are used otherwise by being soaked in water until the impregnation is strong, which water is frequently sprinkled and rubbed over the leaves, this part of the process is a preservative as well as a means of enriching the essence of the leaves; the packages are to be untied and renewed as often as this application is made. Lastly a species of earth called Reh* which is found in the saltpetre lands is sprinkled over the leaves, until they are sufficiently dry; but probably this part of the management is performed merely to preserve the leaves from fermenting when in large quantities, how far the earth does or not impart an impurity seems to be doubtful, however such is the treatment observed in this country, which might be improved upon by following the method of packing used in the Western Countries. It would be worthy a trial to ascertain the effect of the alkali of the same plant, and having made a strong lixivium therewith to wash the leaves with it, dry and store; this might both preserve as well as strengthen the substance of the vegetable quality by resisting fermentations and would seem to be better than the saltpetre of the ground; or a little saltpetre might be mixed with the lixivium to give it the effect of a modified and refrigerating quality which is an essential if the Tobacco be used for smoaking.

The stalks left on the lands are allowed to shoot forth new scions, these continue to grow until the sun enters Pisces when the second crop is cut and treated in the same manner.

The last stalks bear fruit and flower which run into seed.

The produce averages about twenty maunds in each beegah of land for the first crop of a field treated as above. The second crop gives fifteen maunds, the third ten maunds, fourth five maunds. If the lands are superior in kind they often yield at the rate of thirty maunds per beegah.

The prices of the different sorts are—

* This is probably an earth strongly impregnated with an impure carbonate of potash or soda—perhaps with a mixture of both.

1st sort..... 2 0 Rs. per maund.
2d ditto,..... 1 8 Rs. per ditto.
3d& 4th } ditto,..... 1 4 Rs. per ditto.

The Surat and Bhilsah Tobaccos, are the best for cultivation in these countries.

2nd November, 1830. RADHAKANT DEB.

XVII.

NOTICE OF TWO SAMPLES OF RICE FROM ARRACAN.

The following report on some samples of Rice from Kyouk Phyoo, forwarded by Captain Warden, with its annexed notices, is of interest:—

MY DEAR SIR,—I return your musters; I am at a loss how to value them as they are of kinds totally unsaleable here, or in England. Two that I have marked with red ink, would answer for the Isle of France or Eastern markets if better cleaned. When Major Burney was here, I caused a quantity to be prepared in the Bengal manner in his presence, that he might instruct the Arracan and Tavoy people. He wanted one of the men to go with him, but, I believe, did not succeed in persuading them.

The *black* kind is much valued by the Malays, by whom it is called "Bras Pooloo," and the *red* is used here by our boatmen, I believe on account of its cheapness; it is the common produce of Balasore and Cuttack and brought here daily in boats, at prices which, I should think, would effectually prevent the Arracan rice from finding its way so far.

Your's truly,

7th May. WM. COBB HURRY.

BLACK RICE.

This black Rice is not procurable in any large quantities, on the Arracan coasts; but is, I hear, more plentiful on the Martaban coast, at Moulmein, Rangoon, &c., and is only used for sweetmeats as I understand. W. WARDEN.

BENNIE CHOWL.

This Rice is not procurable in any quantities, and is merely used by the Natives, in their sweetmeats; it is capital for puddings, &c. W. WARDEN.

XVIII.

ON THE CULTIVATION OF ARTICHOKES.

By John Brightman, Esq.

[*Read 11th May*, 1831.]

The seed ought to be sown in the month of October in a rich soil. When the plant is about a foot high, it should be transplanted, say 3 or 4 times, or every fifteen or sixteen days, before it is placed in the spot in which it is intended that it should bear. When the plant is put into the ground for the first time, the root ought to be well covered with old manure and the earth heaped up in a mound round the plant of a pretty good circumference and about a foot high, or in proportion to the height of the plant. A small ditch should be made round the mound to hold water, which must be given plentifully every morning and evening.

By the above means, I have had Artichokes in my garden since the middle of March—every 4 or 5 days, a dozen or sixteen,—up to the beginning of May.

XIX.

ON THE CULTIVATION OF ASPARAGUS AT THE MAURITIUS.

By J. Newman, Esq.,

Superintendant of the Royal Botanic Garden.

1. A piece of ground is selected which lays dry but capable of being irrigated, or well watered by means of watering pots.

2. The seeds may be sown at any time of the year. I consider the month of May preferable at the Mauritius, being the commencement of the dry season, and the plants grow very strong before the wet season sets in.

3. I trench about 30 square yards of ground, about one foot deep.

4. At three feet distances trenches are made, one foot wide and one foot deep, throwing the mould taken out on each side, similar to those made for growing celery.

5. The trenches are for about 3 inches filled with rich manure with some of the common mould added and mixed well together; if the people use spades, six inches of mould taken out, and the

manure put in and well mixed by digging would be more economical, so that the trench may be three parts filled, the remaining vacancy being left for the future manuring and blanching the shoots.

6. Having prepared the beds or rows the seeds are sown, (two at every nine inches distance) taking up one of the plants, if both seeds vegetate; I have sown the seed frequently thick in seed-beds, and transplanted in three months afterwards into beds prepared in the abovementioned manner and the Asparagus has been equally fine.

In about two weeks the plants will appear; they must be regularly watered, with watering pots, when the weather is dry; in six or eight weeks they begin to flower, though weak, and in about six weeks after flowering the seeds become ripe.

7. They are suffered to remain in this state, keeping the beds rather dry for a fortnight, when——

8. All the stalks are cut close to the ground, about half an inch of light mould or manure added to the trench and the whole of the beds well irrigated twice per week—if watered with pots they require watering three or four times every week if the weather is dry. In three or four days from 3 to 5 shoots will appear from each plant about the size of goose quills; they must be irrigated as above until the seed becomes ripe again, which will be in about ten months from the time of sowing.

9. The beds now being in a proper state for forcing, if I may be allowed the expression in the tropics, the whole must be kept as dry as possible for a fortnight, after which time two or more rows, according to the wants of the family or extent of the beds, must be cut close to the ground as before and covered about two inches with dung and light mould, if they could be watered once or twice with liquid manure they would gain much more strength by the next cutting; let the water in upon the two beds for use; only in three or five days the stems begin to appear, when immediately two or more beds must be cut and treated in the same way. At this cutting many of the heads will be as fine as moderate asparagus in England. Too many stalks must not be cut for the table at this time, for if the plant is weakened it will injure the next crop; after the fifth day's cutting the next bed in preparation will have become in a state to cut, when no more shoots from the last two rows must be cut but suffered to remain with the others previously cut, to strengthen the plant, and they must be

regularly watered until the seed become ripe again. I find the ripening of the seed the best criterion for judging if the plant is in a proper state for forcing or not, and so on until the beds are cut, when, if the crop has been well managed, the last two or more rows ought to be in bearing when the seeds are ripe on the rows that were first forced.

10. When the forcing commences again, (adding manure at this and other future cuttings) the shoots will be very numerous, many the size of a person's finger, and much more tender than those of Europe, and of an exquisite flavor.

11. I consider it advisable to root up the plants after 18 months or two years, having prepared beds for succession, as, from almost continual cutting they grow much weaker; the third cutting for the table will be the finest.

12. It must be understood, that this mode of cultivating the asparagus is for the dry season only, because, when the rains set in, all forcing is over and the young shoots may be cut indiscriminately from all the beds, taking care always to leave four or five stems to each plant to grow to seed until the dry season arrives again, when it must be treated again in the way before described. For the last two years, I have cut asparagus every day, by adopting the above method in the dry season.

JOHN NEWMAN,

Supt. of the Royal Botanic Garden, Mauritius.

XX.

W. PRINSEP, ESQ.

ON SOME SAMPLES OF SILK FROM BOMBAY,

PRESENTED BY THE LORD BISHOP OF CALCUTTA.

[*Read 11th May*, 1831.]

I should have done myself the pleasure of replying much sooner, but that I wished to try the muster of silk upon the reel. I have not succeeded in getting one large enough, but have made use of a substitute, which has enabled me minutely to inspect the quality and reeling of the thread, of which the following is my report:—

No. 1. *The Poonah Skein.*—Letter A, No. 1, or 4 to 6 cocoons, would be the denomination here of a thread of this size—harsh and dull—has very much the appearance of China Silk but the thread is very uneven, fluey and endy—these terms ap-

ply to the want of equal compactness in the thread; the fault arising most probably from some defect in bringing the different cocoon threads together—it is obviated here by a wheel which crosses the two threads as they rise wet from the basin and serves to bind them firmly before they run into the skein upon the reel. It would be a defect seriously felt by the manufacturer of silk of this size.

No. 2. *The Salsette Skein.*—Rather finer, but would be ranked under the same class of A, No. 1, 4 to 6 cocoons. It is bright, soft, and mellow. The color not quite so pure as the Poonah silk, but the quality generally superior and the reeling decidedly so. This thread is round, even, and strong, but it should be less endy in the skein; it is difficult to judge of this defect unless the skein has escaped handling by others. I think this silk superior to any that is exported from Bengal although I have seen single skeins occasionally of equal value.

I believe that in both the above factories, the reeling might be much improved, by adopting the Bengal size of skein, instead of imitating that which comes from China; it is more easily handled in the making and putting up here, as well as being more conveniently applied to general purposes in the silk-mills of England.

XXI.

ON A NATIVE METHOD OF PRESERVING CUTTINGS.

By Capt. Wade, Political Agent at Lahore.

[*Read 3d November*, 1831.]

It will be satisfactory to the Society to learn that I have established a garden at Loodianah, with the view of acclimating if possible at that station some of the plants and herbs peculiar to the countries North of the Indus which possess a climate nearly similar to that of Europe. Loodianah, from its high northern latitude compared with other parts of India, is favorably situated for the trial of such an experiment, and through the assistance of Maha Rajah Runjit Singh, whom I have succeeded in interesting in the pursuit of my object, I have been enabled to obtain a quantity of slips of the celebrated Grape of Cabool which are in a thriving condition.

The mode in which these slips were brought down to me appeared to be quite novel. They were wrapped in several folds of felt. The slips varied in length from twelve to eighteen inch-

es, and had been cut early in February, so as to admit of their reaching Loodianah in the middle of March when the spring is about commencing. No care had been taken in packing the slips. They were huddled together like a faggot, and had not been opened from the time that they left Cabool to that of their arrival at Loodianah. The man in charge of them, informed me, that the only precaution which he had taken for their preservation on the road was to sprinkle the envelopes with water *every* two or three days, so as to keep them moist.

They were just beginning to feel the genial influence of spring when opened in my garden, several of them having sent forth small buds, and they had not been planted many days before the principle of vegetation was fully developed.

My limited experience does not enable me to say whether such a mode of transmitting vegetable productions from one country to another, is practised in other parts of the world but I can bear ample testimony to its efficiency.

Lahore, 15th August, 1831. C. M. WADE.

XXII.

OBSERVATIONS ON THE CULTURE OF COTTON IN THE DOOAB AND BUNDELKUND.

BY W. VINCENT, ESQ., *of Nudjuffghur.*

Communicated BY G. BALLARD, ESQ.

The "Kuppas," or Cotton, is sown on almost all descriptions of soil, but chiefly in the richest lands, from which, in the March and April preceding, the Wheat and Barley crops have been cut. The land is well manured before the commencement of the rains, and is, in general, sown immediately after the first heavy showers at the end of June or beginning of July, at the rate of 4½ and 5 seers of seed per biggah of 160 feet square; irrigation is seldom necessary, and never before the end of September, or beginning of October. The plant is weeded three times, and rises, in the best lands, to the height of 4 and 5 feet. In inferior lands, to 2 and 3 feet only. The pods are plucked when they begin to burst, which commences in October. and lasts until November, but the Cotton first plucked is the best, although the cultivators make no difference, and mix up both the qualities together. The produce of a biggah is, on an average about a maund of Cotton, and two maunds of seed or "Binnowlah" which is as readily sold as the Cotton itself, being an excellent food for cattle.

The Cotton crop is not so subject to failure as the grain crop in general, and is preferred because it is always saleable which the latter is not.

Some Ryots, but only a very few prefer sowing in May and irrigating until the setting of the rains, which they say gives them produce in greater abundance and of better quality also.

XXIII.

ON THE USE AND PREPARATION OF ARROW ROOT.

By C. K. Robison, Esq.

[*Read 19th August*, 1831.]

The Indian Arrowroot has for years been cultivated in considerable quantities in gardens and provision grounds in the West Indies. The following process for obtaining fine powder, was communicated by a principal planter.

"The roots, when a year old, are dug up, well washed in water, and beaten in a large wooden mortar to a pulp. This pulp is then thrown into a large tub of clear water, well washed, and the fibrous part wrung out by the hands and thrown away. The milky liquor, being passed through a lawn sieve or coarse cloth is suffered to settle, and the clear water drained off. The white mass left at the bottom is again mixed with clear water, and strained; lastly, the mass is dried on sheets in the sun for use.

This powder, boiled in water, forms a very pleasant transparent jelly, very superior to that of sago or tapioca, and has been much recommended by eminent practitioners as a nutritious diet for children and invalids. The jelly is made in the following manner:—To a dessert spoonful of the powder, add as much cold water as will make it into a paste, then pour on half a pint of boiling water, stir it briskly, and boil it a few minutes, when it will become a clear smooth jelly: a little sugar and sherry wine may be added for debilitated adults; but for infants, a drop or two of essence of caraway seeds or cinnamon is preferable, wine being very liable to become acid in the stomach of an infant, and thereby disorder the bowels. Fresh milk, either alone or diluted with water may be substituted for water. For very debilitated frames, and especially for rickety children, this jelly, blended with an animal jelly, as that of the stagshorn,* affords a more nutritious diet than arrowroot alone, which may be done

* Great care should be taken that the true stags, or harts-horn shavings be employed, as the shavings of the bleached bones of the calf, on account of being whiter and much cheaper, are generally sold for them. The latter do not impart so strong or wholesome a jelly as the stag's horn, the bones being nearly deprived of their gelatinous property by the process they undergo to render them white.

in the following manner. Boil half an ounce of the true stags-horn shavings in a pint of water for fifteen minutes, then strain, and add two dessert spoonsful of arrowroot powder, previously well mixed with a tea cupful of water; stir them briskly together and boil them for a few minutes. If the child should be much troubled with flatulency from three to six drops of essence of caraway seeds or a little grated nutmeg, may be added but for adults, port wine or brandy will answer best. By this diet many children have been reared, who, had they been kept on the breast, and the customary spoonmeat, would have died. One lady in particular, who adopted it, has now two children living, in perfect good health after having lost five, either by convulsions or bowel complaints."

The combination of animal and vegetable jellies is much recommended by Dr. Cadogan, in his popular treatise on the management of children, who justly attributes one-ninth of their diseases to their being fed too much upon vegetables. Such an admixture is similar to mother's milk, and probably very superior to the milk of an unhealthy woman.

Mr. Henry Sterne of Jamaica, who for many years has paid particular attention to the cultivation of the arrowroot and the preparation of the farina, having ascertained that the agents in London were in the habit of adulterating it, determined, in future to send his arrowroot to England in packages from half a pound to two pounds, with labels bearing his signature, in order to maintain the reputation he had so justly obtained for the superior cultivation of the root and preparation of the flour. In these packages, as received from Mr. Sterne, the arrowroot may be procured at the rate of four shillings a pound, which in no respect whatever is inferior to that sold by a few mercenary retailers (under the false pretext of being of superior quality) at six shillings a pound, but which is in regard to genuineness and firmness of its jelly, very superior to it.

XXIV.

ON THE WOOL OF THE JEYPORE SHEEP.

By Lieut. Barberie.

Forwarded by Major Benson, *by desire of the* Right Hon. the Governor General.

C. K. Robison, Esq.

[*Read 19th August,* 1831.]

My Dear Sir,—The enclosure may contain little which is not already known; but, as on subjects scarcely attended to,

every additional fact is valuable, the Governor General has requested me to forward, for the Society's information, Lieut. Barberie's communication respecting the wool of a breed of sheep found in the Western Provinces.

If the statement of Messrs. Mackintosh and Co. be correct, the Calcutta price of Wool is about double what the article would produce in England.

Your's truly,

Simla, 28th July, 1831. J. BENSON.

TO CAPT. BENSON,

Mily. Secy. to the Right Honorable the Governor General.

SIR,—Adverting to the notice of the 23d February 1829, inviting suggestions from all classes on subjects connected with commercial resources of India, I trust I shall be pardoned troubling you with a few observations on the sheep of the Jeypore district, the fleece of which it appears to me, might form a profitable article of trade with England.

The expence of the Merino sheep in the hills, belonging to Government, being defrayed from this stud, led me to observe the fineness of the fleece of the droves of Jeypore sheep that occasionaliy pass through here, but not being a judge of wool myself, I deemed it adviseable to obtain the opinion of some person in trade with regard to its value, &c. previous to my addressing you on the subject, and with this view I forwarded samples of the wool to Messrs. Mackintosh and Co. I beg to transmit you a copy of my letter to them, accompanying the wool and their reply.

Of several hundred sheep (wethers) that I have seen brought from the direction of Jeypore, they have been invariably of a large size, white with, generally, black faces, and their fleece finer than that of any other sheep I have observed in India. The price at which they are usually sold here by the drovers, is one rupee a head, and I am informed by a native who is in the habit of bringing sheep from that part of the country, that they are still cheaper on the spot and the wool obtainable at three seers per rupee or about thirteen rupees per maund.

That the fleece becomes finer on the sheep being better pastured there can be no doubt, from the improvement in the wool of the few I purchased; the wool which Messrs. Mackintosh and Co. say is valued at 80 rupees and that at 100 rupees per

maund, in Calcutta, being clipped from the same sheep within three months after they had been well fed.

I have, &c.

(Signed) C. S. BARBERIE, *Lieut. Sub Asst. of Stud.*

Hawper Stud Depot, 20th July, 1831.

TO MESSRS. MACKINTOSH AND CO. *Calcutta.*

GENTLEMEN,—The wool of a breed of sheep of an adjacent district appearing to me to be finer than that of the lower provinces I beg to transmit you a few packs, and shall feel obliged by your showing it to some person acquainted with the wool trade for the purpose of ascertaining if it be fit for the manufacture of Blankets and the coarser sorts of broad cloth, and if so what would be the probable price per lb. in the market.

The longer fleece was sheared from some sheep I bought from a drove passing through here about two months since, and the shorter I cut to day from one of the same sheep; on neither occasion were the sheep washed, nor has the wool been cleaned since.

I have, &c.

(Signed) C. S. BARBERIE.

Hawper Stud Depot, 17th May, 1831.

LIEUT. C. S. BARBERIE, *Hawper.*

DEAR SIR,—Your letter of 17th May reached us in due course, but in obtaining information respecting the samples of wool which accompanied it we have necessarily delayed answering it. The blankets used here of native manufacture are prepared chiefly in the neighbourhood of Patna, and are of materials very inferior to your samples; the prices of them vary from twelve annas to one rupee per blanket, and they weigh on an average 1¼ seer. We believe the manufacture of blankets does not thrive here, and if wool be purchased in this market it will be speculatively; probably for foreign exportation. Your samples are valued here the larger quantity at 80 rupees per maund (of 82½ lbs.) that tied with cotton yarn at 100 rupees per maund. The following is the opinion of a Leeds merchant well acquainted with the value of wool, to whom your samples have been submitted. "The "sample of wool sent is of a very low description, and to the "best of my judgment would not sell for more than 5d. to 6d. "per lb. and the small muster tied with thread at 8d. to 9d. per "lb. If the wool can be laid in, 25 to 30 per cent. below these

" prices, I should say they would sell readily, but I would not " recommend a large shipment as the manufacturers have a pre- " judice against wool they cannot know."

(Signed) MACKINTOSH AND Co.

Calcutta, 7th July, 1831.

XXV.

ON THE ARTIFICIAL PRODUCTION OF NEW VARIETIES OF COTTON.

BY H. PIDDINGTON, ESQ.

[*Read 19th August,* 1831.]

It is well known that no one of the different varieties of Cotton combines in itself all the qualities, which both the planter and the merchant would desire; the Sea-Island is not even exempt from this objection, for it will not thrive unless near the sea. Others again, though fine and easily cleaned, are but poor bearers, (the kidney-seeded sort have this fault) and the Manila, one of the finest and best bearing Cottons, is so excessively adherent to the seed that the cost, and loss by staining while cleaning it, is a serious charge on its production.

It occurred to me in reflecting on this subject that it might be possible to produce new varieties by adopting the plan so successfully pursued by Mr. Knight with the pea, i. e. impregnating the pistil of one sort, with the pollen from the anthers of another, and after two years of trial, I have the pleasure of presenting to the Society samples of Cotton and its seeds, from a cross between the Sea Island and the Bourbon, in which the object was to attain the perfectly smooth seed,* and fine staple of the one, united to the *perreniality,* hardiness, and plentiful bearing of the other. The samples of seed will show, that the first of these objects has been attained. Mr. Finlay's certificate subjoined, seems to show, that the second has somewhat failed; and it remains for time, and the more extended pursuit of this experiment by those to whom Cotton is specially an object, to shew if the others can be so. The few bushes I at present have, are hardy and good bearers, but the season has been peculiarly unfavorable for Cotton.

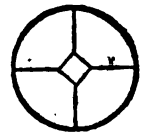
Should this plan eventually prove successful, it seems to open a wide field for the improvement of our Cottons—for the planter

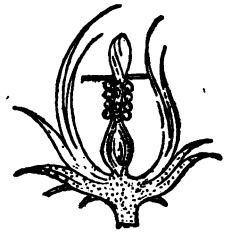
* The Sea Island has a *perfectly* smooth seed, but the Cotton is slightly adherent to that of the Bourbon.

might then *breed* for himself the most desirable variety. There are peculiarities in the method of doing so, which I proceed to describe.

The flower must be prevented entirely from receiving the impregnation of its own anthers, for it will not otherwise receive that from the pollen of another. My first experiments failed, I think, principally from ignorance of this. The structure of the flower too, does not admit, as in the pea, of extracting the anthers without risk of doing mischief. After some trials, the following contrivance perfectly succeeded.

In a small disk of paper, about the size of the marginal figure, cross cuts were made, and the inner angular corners were taken off, this disk was then pushed down over the head of the pistil, so as to bear down, and almost to tear off the uppermost anthers; the elasticity of the paper keeping it closely adherent to the pistil and its outer edge touching the petals, all communication between the pistil and the anthers was effectually prevented. The club-shaped stigma of the flower now only appearing above the paper disk, (a section of the flower in this state, would have the appearance in the margin) was then impregnated by the pollen from another sort, by the assistance of small forceps.





I suggest farther to those interested, that no experiments have yet been made in grafting different sorts of Cotton upon each other, which might be well worth trial.

Neemtollah, 4th June, 1831.

COPY OF MR. FINLAY'S CERTIFICATE.

I have examined the two specimens of Cotton from Mr. Piddington, and would prefer No. 1 as the best, although it comes short of the true Bourbon in length and strength of staple.

No. 2 is still shorter, and besides that there is a good deal of short fibre in it, which would cause a difference in price, of a ½d a lb. less than No. 1.

31st March, 1831. (Signed) JOS. FINLAYSON.

XXVI.

THE METHOD USED IN CAYENNE, TO PRESERVE THE COTTON PLANT

FROM THE ATTACKS OF A SPECIES OF LOUSE, (APHIS?) WHICH OFTEN DESTROYS IT WHEN YOUNG.

Translated from the Annals of Science and Agriculture of the Havannah—Edited by Don Ramon de la Sagra.

[*Read 19th August*, 1831.]

To 200 *pounds* of water, (about 25 gallons) add ten pounds of lime, slaked by exposure to the air only for a few days, and five of wood ashes; mix the whole well together and steep the seeds of cotton for 24 hours, after which, spread them out on a cloth to dry, and sow them without further preparation.

XXVII.

ON THE CULTIVATION OF SAFFLOWER IN THE NEIGHBOURHOOD OF DACCA.

By Dr. G. Lamb.

Messrs. Willis and Earle's communication on this subject and on Bareilly Paddy.

[*Read 3d November*, 1831.]

About a month ago, Dr. George Lamb, of Dacca, was so obliging as to comply with a request which we had previously made viz. to supply us with a small quantity of a species of the Carthamus seed, commonly called Safflower seed, and the best of the kind which is known here under the name of Pattergattah, the place of its growth, near Dacca. He was also good enough to accompany this seed with a short note of the mode in which it is cultivated and prepared by the Natives of that place.

Dacca is the only part of India, at present, where the article is cultivated and prepared in quality at all suited for the trade of Europe, and even there the great bulk of the annual produce of this commodity is prepared with a shameful degree of chicanery.

In the Upper Provinces of Hindoostan, there is a cultivation and preparation of Safflower, naturally not inferior to the Dacca kind, but wholly unfit at present for the Europe trade.

We have the pleasure of laying before the Society a bag of the seed of this Dacca plant, being about one bazar maund, with a copy of the short treatise on its culture and preparation.

We recommend that the same be transmitted to the Superintendant at the Ackra Farm for an experimental cultivation in the forthcoming season.

We have also to send a small bag of 5 or 6 seers of the Bareilly Paddy seed, from which the Rice so highly prized in England is produced, as we have been informed by a respectable native of this place.

For small quantities of Rice, the produce of this kind of Paddy, it would appear, that from 50 to 100 per cent. more has been given in London, than for that of the usual growth of the long grained Rice of Lower Bengal.

Ere the present season passes we would recommend this small quantity of Paddy grain to be transferred to Ackra, for an experimental cultivation.

Calcutta, 6th Oct. 1831. WILLIS AND EARLE.

The Carthamus is extensively cultivated in the neighbourhood of Dacca, on the low lands between the Dallasserry and Ganges.

Soon after the subsidence of the inundation the ground is prepared by repeated ploughing and cleaning, and the seed is sown broad cast in October and November; manure is seldom or never employed, though it often might be used with advantage.

The quantity of seed sown varies from 5 to 7 seers to the biggah of 7000 square cubits. The plant resembles strong, short him; the flowers begin to appear in February and March, and afford employment in collecting them to the families of the Ryots till the end of April or middle of May. The produce of the day's labor is thrown into large gumlahs and steeped during the night in water, and in the morning the whole is beat up into a pulpy mass under the feet of the labourer.

The mass is repeatedly washed with clean water and trode under foot till the liquid comes off clear, and the whole of the yellow dye soluble in water is separated; this process is however seldom carried to its full extent, and in the Safflower sent to market there remains always a considerable proportion of yellow dye requiring to be washed off before the material can be prepared for its final employment in the hands of the dyer.

After the Ryot considers the washing process complete, the mass is divided into small balls which are squeezed flat in the

hand and laid out on mats in the sun to dry. Previous to this last process it is not unusual to adulterate the mass by a mixing with it a quantity of foreign matter, often of the most deliterious quality, which affords a nidus to insects and often proves destructive to the colouring matter, before it reaches England.

After the flowers are collected the plant is allowed to stand till the seed ripens, it is then cut down and thrashed out on the field, or removed to the Ryot's house as suits his convenience. After reserving sufficient seed for the ensuing season, the remainder is sold, at from 1 to 1-4 per maund, to the oil manufacturers, in whose hands it yields about ¼ its weight of a yellow impure oil, used chiefly for burning.

The crop is a profitable one to the Ryot; it occupies the land for nearly six months and is cleared off in time to allow Rice to be sown before the rains have set in. The average produce from good soils is about ten seers per biggah, worth from 5 to 8 rupees, besides the seed which produces from 1 to 2 rupees more.

Rich clayey soils yield a much heavier crop than new sandy lands, and the quality of the Safflower is also greatly superior from the greater proportion of colouring matter it yields, and from being less apt to spoil during a long voyage.

When the best Pattergatta Safflower sells for 25 rupees per maund, the produce of the inferior soils may be purchased for 16 to 18 rupees.

	Rs.	*As.*	*P.*			
Half year's rent of land,.....	0	6	0			
Six ploughings, &c., ...	0	12	0			
Weeding, ...	0	8	0			
Seed, ...	0	4	0			
				1	14	0
Gathering the flowers,.....	1	8	0			
Washing and preparing,.....	1	0	0			
				2	8	0
				4	6	0
Ten seers of Safflower, ...	6	0	0			
Half maund of seeds, ...	1	8	0			
				7	8	0
Profit,....				3	2	0

XXVIII.

ON RAISING PLANTS FROM SEED.

By Mr. John Newman,

Supt. Royal Botanic Garden, Mauritius.

[*Read 14th January*, 1832.]

Dear Sir,—I send with this letter a few seeds, and am sorry I cannot make up a larger collection at present. You will find a nut of the large palm from the Seychelles and called the Coco-de-mer or Lodoicea *Seychellarum*, the vegetable seeds are at present good and of excellent sorts, but a second voyage may perhaps render them useless, I find however, that all seeds, particularly those that have come a long voyage, ought to be sown in moist, but not wet, earth, and not watered for three days after sowing; in wet weather it is advisable to have matting to cover the seed beds until the plants have appeared above ground when they may be watered as is usual. By this simple precaution even many old seeds will vegetate, whereas seeds sown in wet earth, or watered immediately, frequently rot, by having so much water at first. I have tried seeds from the same packet in a dry place and a wet one at the same time and it requires only one trial to prove the superiority of the former. There are of course many large seeds, as peas, beans, &c. that do not require such treatment; however I adopt the same plan even with them, except that they are not sheltered in the wet weather. I find an advantage also in raising my parsley, celery, and such like things in large pots or pans of earthenware, and even the cabbage tribe; in wet weather, they get what water is really necessary for them, but if sown in the ground it is frequently too cold and wet. It would appear to be a troublesome plan to raise seeds in pots, but it requires but few pots to raise a large quantity and they are transplanted into seed beds in a few days after they come up. In regard to your ground being too wet and cold for vines I feel persuaded that if a terrace is made with a few inches of sand at the bottom to drain the water off, and a good compost made they would thrive well, particularly if made wholly above ground and of good dimensions.

John Newman.

Royal Botanic Garden, Mauritius Nov. 4, 1831.

XXIX.

A REPORT ON THE CULTIVATION OF JUTE AND THE MANUFACTURE OF GUNNIES IN BENGAL;

TOGETHER WITH

MODELS OF THE APPARATUS USED AND SPECIMENS OF THE STALK, SEEDS, FIBRES AND CLOTH.

By Baboo Ramcomul Sen.

[*Read 14th January*, 1832.]

In compliance with the wishes of the Agricultural and Horticultural Society, as expressed at its Meeting of November last, I have carefully perused the letter of Mr. Thomason, Deputy Secretary to Government, dated 6th September, with its enclosure, and have the honor to submit an account of the Corchorus or Jute, models of the instruments for spinning it, and machines for manufacturing Gunny Bags; specimen of the fibres, stalk and seeds of the plant, and the cloth manufactured with its thread, as requested by the Government of Bombay.

No. 1. Model of the spinning reel called D'hera.
No. 2. Ditto ditto ditto Takoor.
No. 3. Ditto ditto Ghurguria.
No. 4. Specimen of the Jute Twine called Loti and Fetia.
No. 5. Model of Táná or Warp.
No. 6. Ditto of the weaving machine.
No. 7. Stalk of the plant.
No. 8. A & B specimens of the fibres.
No. 9. A B & C seeds of the plant cultivated in Jessore, Burdwan, and Twenty-four Purgunnas.
No. 10. Ditto ditto Rungpore.
No. 11. Chatee or Jute Cloth called Fetia.
No. 12. Ditto Motáberia.
No. 13. Ditto Nimconchoonia.
No. 14. Ditto Canchoonia I.
No. 15. Ditto Canchoonia II.
No. 16. Ditto Chicunfetia.
No. 17. Chatee Pachagaria.
No. 18. Ditto Chicunfetia ditto.
No. 19. Ditto Pachagaree Fetia.
No. 20. Ditto Thakurgunjee.

I have the honor to be, dear Sir,

Your most obedient Servant,

Calcutta, 13th Jan. 1832. Ram Comul Sen.

AN ACCOUNT OF CORCHORUS OR JUTE.

The Gunnies of Bengal are made with Jute the fibres of the bark of the plant called Pát, of which there are four species.

1. Pát. 2. Tásá. 3. Mestáh. 4th. Cosht'há.

It is sown in April and May, or when there is a sufficient quantity of rain to moisten the ground, which is generally low and ploughed and harrowed in the same manner as Paddy land; the field is weeded after the plants are a foot or half high. When it has flowered which happens about July and August it is cut; the plants are three to twelve feet high, and the circumference of the stalk is about 1 inch.

The following description is given by Dr. Carey, in his Flora Indica:—

"CORCHORUS, Schreb: Gen. n. 917—Calyx five-leaved, Coral five-petalled. Nectary cup-shaped, between the Corol and Stamina. Capsule superior, from three to five-celled, three to five-valved.

"1. C. *Olitorius* Willd. 2. 1214.—Annual—Capsules Cylindrical, five-celled, with transverse partitions between the seeds.

Sans. Putta. Beng. Pát.

"A native of various parts of India. It is much cultivated in Bengal, during the rains, for the fibres of its bark, which the Bengalese call Jute, and employ for a variety of purposes. Of this there is a reddish variety, which the Natives call Bun or wild Pát.

"2. C. *Capsularis* Willd. 2. 1216.—Annual. Capsules globular, five-celled, without transverse partitions.

"Ganja Sativa Rumph. Amb. 5 T. 78. f. 2.—Beng. G'hinalita Pát: cultivated in Bengal and China, during the rains, for the fibres of its bark, of which Gunny or Rice Bags, &c. are made in Bengal.

"3. C. *Fuscus*, R.—Annual—Leaves ovate-oblong, Stamina from ten to fifteen, style single, Capsules sub-cylindrical, six-angled, three-pointed, three-celled, with one row of seeds in each.

"Beng. Titta-Pat.—A native of various parts of India. It flowers during the rainy season and cold season. This species is never cultivated. It differs from *C. Tridens*, in having only one style, and from *C. Trilocularis*, in having only one row of seeds in each cell."

A living plant not being procurable in this season I regret a fuller description cannot be given, but a picture of the plant may be found in Rumph's Herbarium, and also in Camerarius. Hortus Medicus et Philosophicus, §12.

After the plants are cut down their tops are clipped off, and 50 to 100 in number, are bundled together and tied round in lots; ten to fifteen of these lots are laid afterwards in a shallow tank or reservoir, like rafts, over which a quantity of turf and clods of earth are laid to make it sink under the surface of the water; it is allowed to remain there for 8 or 10 days, during which the cultivator daily visits it in order to see that it is properly laid, and the trunks are not unduly rotted. When the bark is separated from the stalk and the fibres become soft the weight upon the raft is removed and the stalks are unbundled. The dresser descends into the water knee deep and takes up 5 to 8 sticks at a time, he breaks off 2 feet of them at the bottom, the bark which is become soft like thread, is held in both hands, and the stalks are taken off; the fibres thus separated, are dressed and exposed to the sun, they are afterwards partially cleaned and finally bundled or lotted, in parcels from one to two maunds, for the market.

The use of the fibres is various; the bark is made into twine for tying thatched roofs, also into ropes, in making *chatee* or gunny bags, (of which an account is given under) curtains, sails, &c.; the stalks are used as matches and playthings; the leaves are used by the peasants as a vegetable, and when of a bitter quality, are medicinal, the seeds are poisonous and blistering.

SPINNING THE JUTE.

A quantity of the Jute is taken out from the bundle, the upper part is tied to a post or to the protruding stick of a thatched roof, letting the bottom hang, which is torn and dressed with the hands, and a thread sufficient for the thickness of the twine required is tied to the instrument called D'hera or Reel, No. 1, held by the left hand and turned by the right, when sufficiently twisted the string is wound up on the body of the reel, and a quantity being twisted, it is taken down and made into a ball called Loti No. 4.

The second method is with the instrument called *T'ákoor* No. 2, which is turned upon the thigh or the sole of the feet, and when a sufficient quantity of thread is spun it is slipped down or separated from the roll called Fetia No. 4.

There is a third mode of spinning by a machine called Ghurghuria, for which a model accompanies this; No. 3. It is similar in principle to the contrivance used by the sailors on board ships for spinning yarn.

WEAVING CHATEE, OR JUTE CLOTH FOR GUNNEY BAGS.

Seven sticks or Chatee weaving-post, called Tana Para or Warp, (model No. 25) are fixed upon the ground, occupying the length equal to the measure of the piece to be woven, and a sufficient number of twine or thread is wound on them as Warpt called Tána. The warp is taken up and removed to he weaving machine No. 6. Two pieces of wood, D and E, are placed at two ends, which are tied to the Oháree F, and Okher or Roller G, they are made fast to the Khotee A B C. The Belut H, or Treddle, is put into the warp, next to that is the Sarsut I. A thin piece of wood K is laid upon the warf called Chapnee, or Regulator. There is no sley used in this, nor is a shuttle necessary; in the room of the latter, a stick covered with the thread, called Sringa, M, is thrown into the warp as woof which is beaten in by a piece of plank, L, called Beyno, and as the cloth is woven it is wound up to the roller. Next to this is a piece of wood called Khetone, which is used for regulating and smoothing the woof; a stick is fastened to the warp to keep the cloth strait.

There are Chatees, or Jute Cloth, of different qualities and sizes, these are sewed or doubled, and made into bags.

The principal places where Chatees are manufactured are Malda, Purnea, Natore, Rungpore and Dacca, where the cultivation of Jute is extensive and the price of labour and land very cheap; but if the labor of spinning the Jute and weaving Chatee, are to be done according to the rates of labour of Calcutta, the price of Gunny would be more than double that for which it is sold. The work even in those Provinces is done in leisure hours of the peasant, by the old decrepid females and children, and any thing acquired by them in this way is considered beneficial.

With regard to Hemp, the price being higher and requiring greater labour in spinning and weaving it is seldom used in making Gunnies for common purposes; but it is advantageously used in making Canvas.

RAM COMUL SEN.

XXX.

ON THE PROGRESS OF HORTICULTURE AT CHIRRA POONJEE AND ON A METHOD OF GRAFTING THE APPLE ON THE KHASIYAH CRAB-TREE.

By W. Cracroft, Esq., *Chirra Poonjee.*

[*Read 14th January*, 1832.]

I have lately received from the Society (without advice) a box containing seeds of maize, of apples, and of quinces, also stones of peaches and apricots. Let me request you to inform me whence these seeds came, and in what manner.

I have given to the chief of Mowflong, (whose village has produced the best turnips and potatoes yet seen in this neighbourhood) some of the maize; and some of the fruit stones also to Dewan Singh, the agent's interpreter who has produced very good turnips in the Poonjee, or village, of Chirra. To the European residents, where I thought it likely to prove successful, I have given some seeds of each sort, and in my own garden I have put the fruit stones in raised ground well watered—the apples and quince seeds I have sown in pots plunged in dung. The thermometer ranges at present from 44° to 61°. Far. in a sheltered place out of doors, but exposed on cloth or wool falls as low as 36° and I have seen it at the beginning of the month at 31°. The cold is so great as to check vegetation; wheat, barley, and oats, were twelve days coming up as also carrots and pease. Radishes came up in seven days but nothing makes much progress.

Potatoes, from seed dug at Morong in September, that have been in the ground a month, have only now began to vegetate, while old seed from Dacca came up in a fortnight and has given off-sets.

4. I find some of the Khasiahs very anxious to receive seeds and plants—and the old women of Mowflong refuse to sell any more potatoes on the grounds of requiring all that remain as seed for the next crop. This sounds well, and I think that next September, you may have some sent to Calcutta for sale, and that in two or three years the market will be supplied from the Khasiah hills from the 15th September till your own new crop comes in: perhaps with carrots and turnips also.

5. Nearly the whole of the fruit trees brought here by Sir Edward Ryan have been sent to Nungklow and Myrong, as well as several grafts from my own Europe fruit trees at Dacca on Khasiah stocks. I intended to have taken the Jargonelle pear, and Hawthorden apple there also, under my own care, but not

knowing whether the gentlemen for whom I am officiating has any predilection for horticulture, and finding the plants were suffering from confinement in the pots, I have put them in the grounds here, but I shall take grafts on the Khasiah stocks, as soon as the plants will afford them.

6. I was very successful in raising seedlings of the Khasiah crab at Dacca as stocks for propagating the Europe apple upon, and recommend the practice to the Society, for which purpose I send a supply of seed. I have taken grafts by approach, when the stocks were from only six to nine months old, from the ends of branches of the Europe apple that were quite green, and found that they adhered perfectly in a month or six weeks. I then loosened the bandage at the middle and let the wood thicken there, then at the upper part, and lastly separated the graft with invariable success, while older stocks often failed. Several trees grafted in this manner are now at Chirra, Myrong and Nungklow, taken from two Europe plants purchased in 1829 from the Society, the names of which I should be glad to recover. I have practised this kind of grafting with plums and peaches for many years, and think the plan superior to using older plants.

7. The Havannah, Maryland and Persian tobacco seeds have all come up, and I have a supply of young plants in a sheltered spot ready to be planted out when there is no longer danger from frost.

8. We are in want of some good seeds of the following descriptions—of holyoaks (single), fine potatoes, lettuce, onion, asparagus, parsley, and beetroot, pray do me the favor to procure a good supply of each, and send by dawk banghy; also of lucerne, guinea-grass, and clover, directed to the care of W. Rhodes, Esq.

9. I shall also esteem it a favour if the Society will supply me with plants of all the species and varieties of prunes they possess, also of amygdalus if they have any. I always succeeded in raising the latter from the almonds brought by land to the Western Provinces; but those imported by sea to Calcutta always failed, having been heated in the hold of a ship.

10. I have to beg most particularly that any plants sent to me by boats may be forwarded without being put under thatch, which invariably destroys nine-tenths of them—pray be particular in this point and have boats without chuppers to bring the plants for Chirra Poonjee: if directed to the care of Mr. Inglis at Chattuck, they will be taken care of till they can be forwarded; seeds may come by dawk banghy.

Chirra Sanatorium, Dec. 5, 1831. W. CRACROFT.

XXXI.

ON THE PRODUCTION OF SILK AT KAMPTEE,

By Miss Anna Calder,

WITH

MR. PRINSEP'S REPORT ON THE SPECIMENS FORWARDED.

[*Read 8th September,* 1830.]

I take the liberty of forwarding a specimen of Silk collected by me from November, 1827, to August in the following year, in which month I was obliged to give them up; and during the first two I met with many accidents in rearing the insect, being then perfectly unacquainted with all its enemies, of which I found by experience, a host to contend with. I had but a trifling produce, merely sufficient to teach me the culture and the spinning it off the cocoons, in which I wasted much, having no instruction or any thing to guide me but my own ideas; after that, my stock increased, and was generally from three to four thousand, sometimes not near so many, in the month. I was however very limited in my means for keeping them, having only a small bathing room for the purpose, and in attendance also, for the care, spinning, and all was performed by myself and two little girls under the age of twelve years, (natives) one of whom is with me now, and equally anxious with me about our industrious little favourites; neither had I then one mulberry leaf in my own compound. The skein which I send is but the sixteenth part of what I can produce, besides I have used some and given much away to my acquaintance, never supposing that I should offer myself as a candidate for support in the culture of Silk; but I find myself in a station so adapted to the purpose that I have no doubt, with a little assistance, I could make the article an object with every poor person who had a spot whereon to plant a mulberry-tree, so simple is the mode I adopt in the care of it. Here, within the limits of my own compound, I have sufficient food for millions, large overgrown trees of the finest description; and I even think I shall be able to make the worm feed itself, after a while; but as I never had an opportunity of trying that experiment, I will not be positive; time will tell. Just now my object is to see what my own single effort would be likely to produce from this spot; but as I have not the means of accomplishing that, I should require assistance, for the purpose of raising sheds with chunamed reservoirs for water, a couple of men to attend the trees, bullocks to water them, and women or girls, whom I would teach to collect and wind the silk, whilst the insect itself would require the care of one steady person and

some boys, all of course under my own eye. Now all this I cannot afford to do; but my positive belief is, that it would, in the course of twelve or eighteen months, amply repay the trouble and expense. There are other things, such as wheels, baskets, &c., required. It is not many years I believe since the Government made an allowance for a like experiment, but without a similar prospect of advantage to that which I foresee, and my most anxious wish is, that it should reap one through the efforts of a female, whose greatest reward and pride would be to see the general culture of an article which constitutes her greatest amusement, extend itself over a country where it has been hitherto unknown, and where, of all other places, it is the most suitable. During the short period I kept them they drew my admiration so entirely that I studied them with the most intense interest, and am now so well acquainted with their habits that I could detect a sick one amongst a thousand. Should my plan meet your approbation, and the specimen I send be worth acceptance, I shall be most happy. I must, however, say it is not worth so much notice now as it has been, having lost much of its brilliancy during the long time it has been laid by, and by the many hands it has passed through for inspection. The thread has been wound through hot-water, and contains fifteen or sixteen of the cocoon threads.

[*Read* 19*th August*, 1831.]

Some months ago I did myself the pleasure to address the Society on the culture of Silk, although I had not at the time succeeded in procuring a number of worms, having since been many times disappointed by the insects dying on the road and even being destroyed by ants in the banghy, I have now the pleasure to state that I ultimately succeeded in having from a parcel which arrived on the 31st of December last, about forty-two, but in a very weak state, and though I afterwards got a few others, I consider those as the parent stock. It will serve perhaps as a proof that on care and good feeding depends all, when I say that those sent were wretched bad cocoons and took 39 days to spin, they then remained 14 in the crysalis state, but from care I found them improve every time, and that they now spin in eighteen days and remain enclosed but nine. How much they may improve I shall be able to say hereafter. The late two months of hot winds prevented my doing more than to keep them for stock, and I have now a number in high health. As I had so few at first I did not collect the cocoons until the third generation, and after saving a great many for eggs I found to my surprise I had upwards of twenty one lbs. weight when the

winds put a stop to them: though, were proper places erected to keep the worm I am convinced they could be reared at all times as the mulberry is in as firm a state then as at any other time. I perused with great interest a letter from Messrs. Dover and Norton read at one of your meetings some time back, and the specimens which accompany this, I collected as well as I could after their directions, I also remarked at your last meeting the silk sent from Bombay. That I now send is, No. 1, the first ever taken at this place and by *myself*, No. 2, also by me, and No. 3, the work of a native woman who never attempted it before, and to whom, with a strict injunction as to care in not wasting it, I gave one ounce of cocoons; whether the produce be sufficient I am unable to say; I labour under sad ignorance as to gathering the silk, nor can I comprehend what the gentleman meant, whose opinion was quoted on that from Bombay, by saying it would be better if collected in the Bengal manner, being twisted by a wheel ere it reached the reel, could I be informed on this subject it would be the means of forwarding my object greatly; indeed were a proper apparatus forwarded to me through your kind interference, I should be most thankful and gladly bear any expence that might be incurred as to the making, carriage, &c. also I should like much to know in what manner the refuse silk such as the perforated cocoons, and so on, disposed of. I submitted this silk, through the Resident, for the inspection of His Highness the Rajah of Nagpoor, who was greatly pleased, and sent it to a committee of native silk merchants, whose report was mighty flattering to me, so much so, that His Highness has kindly volunteered to assist me by bestowing some ground and giving people to cultivate it for a year. I only now, therefore, require information on the subject, as even here the natives seem most anxious about it, flocking in numbers and offering their services, so aware are they of what is likely to be the result. As a proof of the improvement I send two or three of the original cocoons and as many of the last.

Kamptee, June 20, 1831. ANNA CALDER.

[*Read 5th March*, 1832.]

C. K. ROBISON, ESQ., &c. &c. &c.

MY DEAR ROBISON,—I have now the pleasure to send you a few remarks which may be of service to Miss Calder when you reply to her letter.

The principal defect in her silk is, its want of staple, and it is one of most serious consequence; by this is understood a want

of adhesion of the various fibres which compose the thread, and I should conceive it to be owing to its not receiving the usual twist while being run off from the basin to the reel. This twist is acquired by winding always two threads at the same time, each being composed of its proper number of fibres or cocoons. They pass in a parallel direction to an iron director which has two small holes in it for the threads to run freely through, and then the two threads should be crossed round each other from four to eight times, according to the strength of the cocoon fibres, before they again pass through the eyes of the reel-guide on the reel according to the following ground plan:

This crossing, while the thread comes soft from the warm water, gives a consistence to it which cannot be acquired by any other means, it also serves greatly to clear it of imperfections which will invariably fly up from the cocoons during the rapid process of reeling. To make the reeling perfect also it is necessary that the *reel-guide* should have a lateral motion while the reel goes round, it will then lay the thread cross ways upon the reel and prevent its becoming entangled when the skein is taken off; but perhaps the Society will send her up a small model of the Italian Novi reel, which is most approved in the Company's factories.

In reply to some queries regarding the process of the worm itself, I have the pleasure to add some particulars from which Miss Calder may, by comparison, estimate the value of the produce of the worms of Kamptee, which from her description appear to be of very different character from those of Bengal. We have two descriptions of worms, the annual and the monthly one; of the first the worms are kept in a close vessel for a twelve month, at their term of ripeness, they eat for forty-three days, they remain dormant one day and then complete their spinning in two days. In fifteen days more they eat their way out, if not killed in the inside of the cocoon, by exposure either to the noon-day sun or to the heat of an oven; on the same day that they emerge from the cocoon, they will, in twelve hours, lay on the average 400 eggs, and they then die. One maund of 80 sicca to the seer of these cocoons will yield about 3 seers of good silk in the skein.

The other worms, called generally the small cocoons, which ripen almost every month during the year, in different parts of the country, are of every inferior quality. The egg hatches in eight days, the worm then eats for twenty-four days, remains dormant one day, completes its spinning in one day, and will emerge in eight days, if not destroyed as abovementioned. In

three hours after emerging, it lays 300 eggs on the average. One maund of eighty sicca weight to the seer, will yield on average about 2¼ seers of good silk in the skein. There will be produced at the same time, from this weight of cocoons, 25 chittacks of chassum, or waste silk, the remainder is dirt or dead cocoons.

Should Miss Calder require further information regarding any stage of the production of Raw Silk, I shall be most happy to make my experience, or my services in enquiry, available to her, and I shall be more punctual, I hope, in doing so. I shall be very glad to see the result of her comparison of our cocoons with her own, as well as specimens of her future filature.

I remain, &c.

WM. PRINSEP.

XXXII.

ON THE MANUFACTURE OF PAPER USED BY THE NATIVES.

To C. K. ROBISON, ESQ.

MY DEAR SIR,—I yesterday received the communication from the Agricultural and Horticultural Society, dated 12th instant, forwarding a copy of a communication from Mr. Thomason, Deputy Secretary to Government, under date of the 3d instant, to which I now reply.

When we commenced paper-making several years ago, having then no machinery, we employed a number of native paper-makers to make it in the way to which they had been accustomed, with the exception of mixing conjee or rice gruel with the pulp, and using it as sizing; our object being that of making paper impervious to insects. Our success at first was very imperfect, but the process was conducted as follows.

A quantity of sunn, viz. the fibres of crotolaria juneca, was steeped repeatedly in lime water, and then exposed to the air by spreading it on the grass; it was also repeatedly pounded by the dhentzee or pedal, and when sufficiently reduced by this process to make a pulp, it was mixed in a gumla with water so as to make it of the consistence of thick soup. The frames with which the sheets were taken up were made of mat, of the size of a sheet of paper. The operator sitting by the gumla dipped this frame in the pulp, and after it was drained, gave it to an assistant who laid it on the grass to dry: this finished the process with us; but for the native market this

paper is afterwards sized by holding a number of sheets by the edge, and dipping them carefully in conjee, so as to keep the sheets separate. They are afterwards dried, folded, and pressed by putting them between two boards, the upper one of which is loaded with one or more large stones.

In the English method the pulp is prepared by the mill and put into cisterns; the frames are made with fine wire, and the workman stands by the cistern and takes up the pulp on the frames. The sheets when sufficiently dry are hung on lines to dry completely, after which they are sized, if sizing be required.

We now make our paper by machinery, in which the pulp is let to run on a web of wire, and passing over several cylinders, the last of which are heated by steam: it is dried and fit for use in about two minutes from its having been in a liquid state.

I am, my dear Sir,

Yours truly,

W. CAREY.

Serampore, April 20, 1832.

To C. K. Robison, Esq.

Secretary to the Agricultural and Horticultural Society of Bengal.

Dear Sir,--I have the honor to acknowledge the receipt of your letter of the 12th ultimo, with a communication from Mr. Thomason, Deputy Secretary to Government, requesting me to furnish information, in communication with the Reverend Dr. Carey, regarding the manufacture of paper required for the Government of Bombay.

2. Dr. Carey having already furnished the required information, drawn from experimental observations made by the Reverend gentleman in making the article on his own establishment at Serampore, in a concise but clear manner, little remains, I think, to be said on the subject; but as his account is confined to one particular kind, and as the report we are required to furnish to the Society, should contain all the information we possess, or may possibly be able to procure regarding the manufacture of it, I beg to give such of the details of the operation as have been omitted in that report.

3. The paper used for the ordinary purposes of Government and by the natives in this country, is manufactured in several districts of Bengal and Lower Hindoostan, but the sort made in the district of Burdwan excels all others both in quality and

durableness, it is of a brown colour, and more smooth than those made in Arwal and Shahabad called Patna paper.

4. The following are the principal places where the paper is manufactured, as an article of commerce, and which supply the whole of Bengal and a considerable portion of the Upper Provinces and Eastern countries with that article.

Niala.
Sotgong.
Mánád.
Shahábazar,
Moynone,
} In the district of Burdwan.
Balessore.
Bankepur.
Arwal.
Shahar.
Hurihar Gunge, and
Calcutta.

Besides these places it is also made at Denajpur, Dacca, Moorshedabad, &c.

5. The denominations of the paper are given according to their different sizes called Roka, which means fold or page.

16 Roka.
12 Ditto.
8 Ditto. Sixteen Roka is a sheet which may be folded into 8 leaves or 16 pages octavo; they are likewise called after the names of the places where they are made.

1. Satgong.
2. Shahabazaree.
3. Moynonee or Manion.
4. Balessoree.
5. Arwalee.
6. Heranandee.
7. Patanaye.
8. Baganiah.

6. I beg to send you musters marked 1 to 23.

Nos. 2, 5, 11, 12, and 15 are used in Native Schools.

Nos. 1, 3, and 4 by grocers for packing the articles they sell, and in fire-works and play-things.

Nos. 8, 9, 10, 13, 14, 16, 17, and 18, in writing books, documents, &c.

Nos. 19, 20, and 21 in printing.

Nos. 6, 7, 22 and 23 in books, drafts, bills, &c.

7. The materials used in the manufacture of the different sorts of paper are almost nearly the same; but the process is

dried, they are gathered and made into parcels of from 50 to 100 sheets each, and removed to the beating machine called pitna E or a piece of thick timber half buried in the ground, the upper part of which is concave, plain and smooth, like the washer's cloth-beating log. The sheets are laid upon the wood with one hand, and a mallet (F) held by the other with which the paper is beaten, softened and smoothed.

19. The next process is the sizing. A quantity of fine Arwal rice or wheat is first pounded, strained, boiled with water, and strained again through fine cloth, and kept in a pot; then large boards well smoothed or planed are placed upon the ground, the sheets of paper are laid flat one at a time, and daubed with the paste. This part of the work is generally done by the females and by old men. It is performed with the palm of the hands with dry titpula (Luffa amara) or brushes made of soft fibres for that purpose.

20. The sheets are dried in the shade or in a mild gentle sun-shine and are then collected and put into a press: if the paper be of a fine quality. They are afterwards rubbed or glazed with gila (seeds of memosa scandens), shells or stone balls; the edges are then cut off, and the sheets folded and bundled into quires and lotted into guddies, and corges, in the usual manner; 24 sheets make a quire, and 10 quires a guddy.

21. The Patna paper is principally made of gunny bags, mixed with damaged paper; its sheets are larger, and the colour is whiter than that of the Bengal paper, but it is not so strong and is sooner affected by damp. Its superiority in colour is attributed to the use of a large quantity of lime and sajeematee, and to the manufactories being on the banks of the Soane river, the water of which is very clear.

22. The manufacturers prepare the pulp in the same way as above, but keep the materials dipped in water much longer. They put 12 maunds of the pulp into each vat built with masoning called ghanee; each ghanee yields about 30 guddies of paper. The quality of the paper is according to the number of casts or the period of manufacture. There are four casts called also ghanee, the November and December ghanees generally produce the most superior sort of paper.

23. In Arwal the paper is made of pounded oakum, netts and cordage, pasted and glazed, which makes the paper called Heranandee and Arwalee. The former is made at Hurchar Gunge and the latter at Arwal.

24. The makers occasionally use water of vitriol to preserve it from insects.

25. The instruments used in the manufacture are rough and coarse. Were they to substitute web iron sieves, and shake them by some other instrument, the paper might be more smooth. It is also suggested that lint should be introduced in making paper instead of gunny bags and jute.

I am, Dear Sir,
Your most obedient servant,
Ram Comul Sen.

Calcutta, 31*st May*, 1832.

N. B. The drawing to which reference has been made in this paper, has not been supplied.

XXXIII.

ON A SPECIMEN OF COTTON, GATHERED IN THE BOGLEPORE DISTRICT FROM A SHRUB IN ITS WILD STATE.

[*Read 9th August*, 1832.]

To C. K. Robison, Esq.

My Dear Sir,—Will you kindly lay before the Society at the next meeting, the accompanying specimen of Cotton as an important fact in the culture of that plant is involved in its quality.

It is from a cotton shrub growing in the jungly hedge of a garden near Boglepore, and the weeds only cleared from about it last year.

The seed was introduced about twenty-five years ago at Boglepore, and tradition makes it originally from Bourbon.

If the quality of the cotton be found good, it may be considered as a proof that the plant does not degenerate in that part of Behar at least.

Yours sincerely,
C. F. Hunter.

Calcutta, 17*th Sept.* 1831.

To C. K. Robison, Esq.

My Dear Sir,—Herewith I have the pleasure to return the tin box containing the two samples of cotton, also Mr. Hunter's letter. Is not the loose cotton Bourbon cotton Native grown? That in the paper with the seed attached to it, appears to Mr.

Willis and myself to be the cotton alluded to by Mr. Hunter; and if grown under the circumstances stated, is really a strong proof of the soil, and climate of Boglepore or its vicinity being highly suitable to the cotton plant. This on the seed though not so good as the loose cotton in the box, is still very valuable. It is *finer* than the presumed Native Bourbon, but not so strong; still considering its fineness, we do not call it a weak cotton, and the staple is of fair length. Pray excuse my having for two days forgotten to return you the box as promised.

Your's sincerely,

September 21*st*, 1831. W. EARLE.

XXXIV.

USE OF THE SAW GIN.

[*Read January* 14*th*, 1832.]

To C. K. ROBISON, ESQ.

Secretary to the Agricultural and Horticultural Society.

SIR,—The Acting Resident at Calpee being desirous of some account of the experiments made with the saw gin by the Agricultural and Horticultural Society last year, a copy of your communication of the 19th July was forwarded to him accordingly. Mr. Truscott, however, is now desirous of further information on the subject, and has with this view submitted three queries to the Board, who, considering you to be better qualified to speak to the point, have desired me to annex the same, with a request, that you will be good enough to answer them at as early a period as your convenience may permit.

I am, SIR,

Your most obedient servant,

F. MACNAGHTEN, *Secretary.*

Fort William, 11*th November*, 1831.

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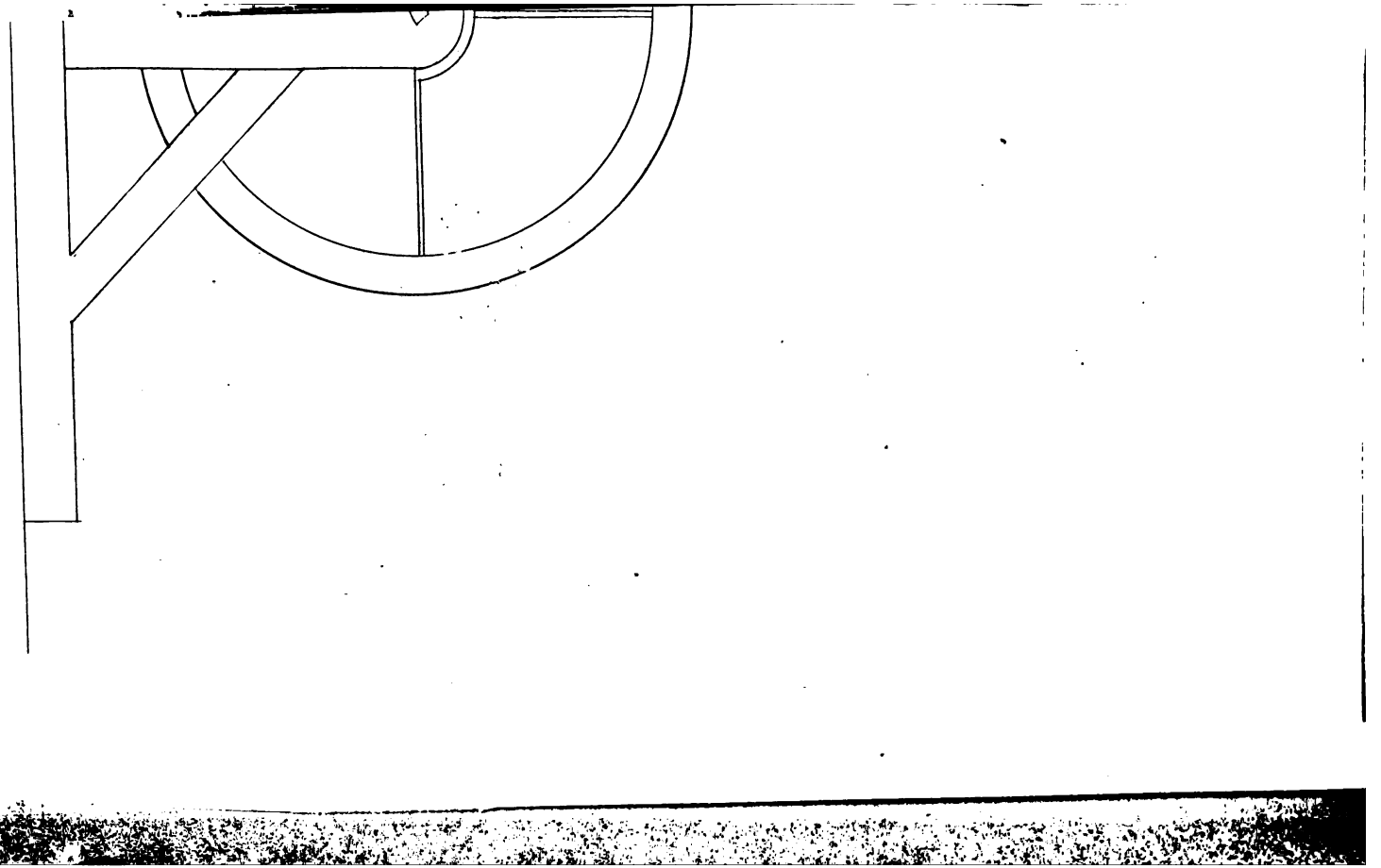
1. What quantity of clean cotton was obtained daily from the saw gin worked by ten men?

2. What was the expense of cleaning a seer or maund of cotton by the above method, compared with the expence of cleaning an equal quantity by the common Hindoostanee churky?



3. The employment of the saw gin in America tends to deteriorate the quality of the cotton. Is the staple of the cotton cleaned at Akra superior or inferior to the cotton cleaned by the Hindoostanee churky?

(A true copy.)

F. MACNAGHTEN, *Secretary.*

Reply to the foregoing Query.

To C. K. ROBISON, ESQ.

Secretary to the Agricultural and Horticultural Society, Calcutta.

SIR,—In reply to your communication of the 16th instant, I beg to say that no exact account was kept here of the quantity of cotton cleaned with the saw-gin during the interval of a day, but in my letter of the 7th June last on this subject you will find it stated, that the saw gin was capable of cleaning 30 seers of cotton with the seed by weight in an hour, which gives 10 seers of clean cotton and the remainder seed; this was timed by me; therefore at this rate working the gin eight hours out of the twelve with 10 men, would give 80 seers or 2 maunds of clean cotton in the day, the cost of which would be 1 Sa. Rs. 1 an. 4 pie, being at the rate of 3 Rs. 4 as. per month per man, which is the amount paid here for coolies; or divide the quantity by 10, gives 8 seers per man; the cost of his daily labour being 7 pice, makes the charge for cleaning a seer or two pounds of cotton not quite one pice.

2d. In reply to the query regarding the Hindoostanee churky, I am not at present capable of replying satisfactorily, not having seen any cotton cleaned with it, nor have I been able to procure one here, to try the experiment on it, but from the information I have collected from the neighbourhood, I am given to understand that the utmost one man is able to clean with the Native churky of clean cotton is one seer, and this by uninterrupted labour throughout the day. If this be really the case, the cost will be, calculating at the same rate per month, equal to 7 pice per seer or two pounds, making a difference of eight to one in the quantity cleaned and nearly seven to one in the cost of labour. A circumstance deserving consideration where a large quantity is to be cleaned.

3d. There is not the least doubt of the American saw gin injuring Sea Island cotton, and all other descriptions partaking of its nature, viz. long-staple, but I do not think it injures short staple cotton. The Bourbon cotton which was cleaned here has not a very short staple and it did not appear to have been injured. The preference however must be given I should think to the native churky as far as regards any deterioration taking place in the quality of the cotton from cleaning, as the cotton instrument from its simple structure being merely a couple of cylinders turning against each other, cannot in any way injure the staple of any description of cotton.

I remain, SIR,
Your most obedient servant,

J. M. DE VERINNE,
Superintendent of Akra Farm.

Akra, 21*st Nov.* 1831.

To C. K. ROBISON, ESQ.
Secretary to the Agricultural and Horticultural Society.

SIR,—In answer to your letter of the 16th instant relative to the properties of the saw gin, I have the pleasure to give you the following information.

We applied a belt from the machinery to the saw gin which made the saws revolve at the rate of 150 to 160 revolutions per minute, and the speed gave us, with only one man attending it, about 3 lbs. of clean cotton in ten minutes equal to 144 lbs. per day of 8 hours. This could be effected by manual labour also, viz. by five men, but a more effective driving apparatus than the one accompanying the machine would be required.

The effects of the saw gin compared to that of the native churky or rollers is as 18 to 1.

As far as I could perceive, I do not think the quality of the cotton was deteriorated by the saws, it was however comparatively short stapled cotton that we had cleaned by them; how far long stapled might be injured, I cannot at present say.

I am, SIR,
Your most obedient servant,

W. PATRICK.

Calcutta, 22*nd Nov.* 1831.

XXXV.

COTTON OF AVA.

[*Read 3d November*, 1831.]

To C. K. Robison, Esq.

Secretary to the Agricultural and Horticultural Society.

Sir,—I am directed by the Honourable the Vice President in Council, to transmit to you for the purpose of being communicated to the Agricultural Society, the accompanying extract from a dispatch from the Resident at Ava, dated 14th July last, and the paper on cotton therein mentioned, together with two bags of cotton, and specimens of Nankeen cloth manufactured by the Burmese and Shauns.

I have the honour to be, Sir,

Your most obedient humble servant,

Geo. Swinton, *Chief Sec. to Govt.*

Council Chamber,
26th August, 1831.

Extract from a dispatch from the Resident at Ava, dated 14th July, 1831.

Par. 6. "Having lately drawn up a paper containing some notice of the cotton of this country, I beg leave to enclose it for the information of Government. I have already sent to Captain Rawlinson, to be forwarded to you, two bags containing samples of the white and red cotton procurable here."

(A True Extract.)

Geo. Swinton, *Chief Sec. to Govt.*

SOME NOTICE REGARDING THE COTTON OF AVA.

The Burmese, it is well known, cultivate cotton very extensively, and the larger portion of the produce is exported; conveyed to China by the inland routes, and to Arracan and the districts of Chittagong and Dacca, either overland, by the two passes of An or Aeng, and Talak or Dalet, or by sea, from Bassein round Cape Negrais.

Two British Merchants, Messrs. Laird and Gouger, who had both resided for some time at this Capital, when examined by

Mr. Crawfurd at the close of the war, gave him the following information respecting the probable quantity of cotton annually exported from this country. Mr. Laird considered that the quantity exported from Ava to China annually, could not be less than 70,000 Bengal bales of 300 lbs. each; that is, 21,000,000 lbs.; and Mr. Gouger estimated the quantity annually taken to Dacca by Burmese boats, to be about 20,000 bales of 100 viss or 360 lbs. each, that is, 7,200,000 lbs. See Appendix to Crawfurd's Mission to Ava pp. 44 and 75.

I am of opinion, that Mr. Laird's estimate of the quantity exported to China is far too high, although my enquiries from the Burmese themselves would go rather to confirm its accuracy. At my request Mr. Lane, an English merchant now residing here, privately applied to the Clerk or Collector, who levies the export duty of 3 ticals per 100* viss on cotton conveyed to China, and received the following statement of the quantity on which duty was actually levied during the year 1830, at the two Chinese marts, Madè and Ban-mau pronounced Bamau.

At Madè	3,600,000 viss,	or, 12,960,000 lbs.
At Ban-mau.....	6,700,000 do.	or, 24,120,000 do.
Total	10,300,000 viss,	or, 37,080,000 lbs.

The number of boats-load of cotton annually taken to Madè and Ban-mau was declared by the same person, to amount to, 1400; and he estimated the exports from the Shan countries to China at 1,200,000 viss, or, 4,320,000 lbs.

The above statement affords a striking proof of the very great difficulty of obtaining in this country, any accurate information on questions of statistics. I am convinced that the Burmese clerk has added a cipher in each of the above sums. Cotton is taken from Madè to China on mules and ponies, each having a load of only 50 viss, as I ascertained on the spot. At this rate, to convey 3,600,000 viss would require the extravagant number of 72,000 of these animals! My enquiries at Madè assured me, that the whole of the Chinese traders this year did not exceed 5000, and as some of them make two or three trips in the season, I should think that 7200 loads of cotton, or, 360,000 viss, would be just about the quantity conveyed from Madè. Besides, all the cotton boats, which are remarkable objects on the river, pass close to my house, and I am positive, that the number during

* Equal to about 12¾ annas per maund, or 7¼ per cent. *ad valorem*.

the past year has been nothing like 1400. Those which proceeded to Madè, between December and April, conveyed each about 100 bales, or rather large baskets containing 100 viss each, and I should not estimate the number which passed, at more than from 30 to 40. Those which transport cotton to Ban-mau, proceed at all seasons of the year, but they are less heavily laden than the boats which go to Madè, carrying not more than 60 baskets of 100 viss each; and 110 boats would be as many as I would allow to have passed to Ban-mau during the year. Captain Cox was informed in 1797, that the number of these cotton boats was from 100 to 150, each carrying 10,000 viss, and the average amount of sale of the cotton 600,000 ticals.

With respect to the quantity taken to Arracan by the route of Aeng, we have the information collected by Captain M. G. White, Principal Assistant to the Superintendent of Arracan, in a report made by him after visiting Aeng in April last year, that the number of bullocks which went to Arracan from Ava during the preceding year, amounted to 20,000, each carrying a load of two Bengal maunds; but as much cutch, stick lac, and other articles are taken to Arracan (the Chinese caravans export scarcely any thing but cotton) we cannot perhaps allow that more than one-half of this number of bullocks conveyed cotton. Perhaps one thousand more bullock-loads, however, were taken by the less frequented route of Talak; and this would give an amount of 22,000 maunds, or, 1,804,000 lbs. exported to Arracan overland. If a similar quantity be allowed for the exports by sea, the whole amount would be 3,608,000 lbs. which would still be far from Mr. Gouger's estimate. But I have no means of ascertaining the amount of the exports by sea, to which mode of conveyance alone Mr. Gouger's estimate appears to be limited. I can only observe, that allowing the boats from Bassein to take 60 bales, or 21,600 lbs. each, it would require 83 large boats to convey the 1,804,000 lbs. which I allow to be exported by that route. Captain Cox reported the number of boats, that traded in his time between the Southern Burmese ports and Luckipore, Dacca, &c. proceeding by the way of Bassein, not to exceed 42 very large boats, and the value of their cargoes, exclusive of specie, 20,000 ticals only. But Mr. Gibson estimated the number of boats which annually go from Lamina, a town on the Irawaddy above Bassein to Arracan and Bengal to exceed 1,000. Following my estimate, the exports of cotton from this country would not be more than as follows:

From Madè to China, ...	lbs.	1,296,000
From Ban-mau to ditto, ...		2,412,000
To Arracan, Chittagong, &c. via Aeng,		1,640,000
To ditto via Talek, ...		164,000
To ditto by boats, ...		1,804,000
Total lbs.		7,316,000

The ponies and mules of the Chinese caravans, which are very poor, miserable animals, do not carry much heavier loads than the bullocks which travel to Arracan. The latter carry 2 Bengal maunds, or about 164 lbs. and the former 50 viss or 180 lbs.; but the Chinese traders have an ingenious mode of compressing the cotton into a small compass,* by forcing it into pits dug in the earth, of the size and shape required to fit the back of their ponies and mules. Over the pit is placed a mat which is forced down with the cotton, and serves to pack it. Both Colonel Symes and Captain Cox mention that the Nankeen cotton is carried to China; but I saw no other than the white at Madè, or in any of the boats which have passed my house, and I am assured, that that description alone is taken to China. It is used there, the Burmese say, almost entirely for quilting. In the time of those officers also, Tsa gain, opposite to Ava, seems to have been the great mart for cotton. At present, however, a small village about two miles below Ava, and on the same side of the Irawaddy, called Lettshoung-yoo, is the spot where the cotton is generally collected, packed into baskets, and shipped in the large Burmese boats, which convey it to Madè and Ban-mau.

Messrs. Gouger and Laird informed Mr. Crawfurd, that the Burmese cotton was conveyed to Dacca, to be used in the manufacture of the fine Dacca muslins. This same information was given to me by all traders in this country; but it would be worth ascertaining at Dacca, if such is really the fact, for I observe that lately in England, a good deal of enquiry has been made, without any one being able to answer it, as to the particular cotton of which the fine Dacca muslins are manufactured. (See Minutes of Evidence before the Committee of Evidence before the Committee of the House of Lords on East India Company's Affairs, part 10, Question 4729 to 4750.) Bishop Heber in his journal states from Dacca, that "the cotton produced in this district is mostly sent to England raw." (Octavo Edition, vol. I. page 285), and Walter Hamilton, in his

* Neither the Chinese here nor the Burmese have cotton screws.

description of Hindoostan, Quarto, vol. I. pp. 182 and 184, states under the head of Dacca, that a considerable proportion of the cotton is raised in the adjacent country, but a great deal is also received by the course of the Ganges from Patna and Upper Hindoostan; and that "in this district a species of cotton, named the *banga* grows, necessary, although not of a very superior quality, to form the stripes of the finest muslins."

The Burmese cultivate cotton in almost every part of their country, but the largest quantity is grown in the districts lying between Ava and Prome. It is *not* grown as a second crop after the cultivation of rice, but in distinct lands. The seed is sown about the same time with the paddy, in the beginning of the rains in the months of Katshoun and Wagoung, our April and May, and the cotton is gathered in Tha-dengywot and Ta-tshoun-moun, our October and November. The seed is sown *broad cast*, after being well washed with water, and the ground is weeded three times before the plants attain the height of three feet. A scanty second crop is sometimes gathered in the months of Tahoung and Tagoo, our March and April, before the plants are cut down, and the ground prepared for fresh sowing. Frequently, at the same time with the cotton, brinjalls and other esculent vegetables are sown; the seeds of the two are mixed, and thrown on the ground together.

The Burmese know only the annual plant. The Nankeen called *Wa-nee*, or red cotton, is often grown in the same fields with the white; and some cultivators assured me at first, that the seeds of the two are precisely the same, and that they cannot tell which description of cotton will be produced, until the flower appears. But upon further enquiry I find, that the seeds are mixed by the women and others employed in cleaning the cotton, and that no trouble is taken to separate or keep the two distinct, by which means the mixed seed is usually planted. A careful enquiry would enable the planter to discover from the small portion of cotton adhering to each seed, whether it belongs to the white or nankeen species; but this would give too much trouble to a Burmah. No manure is used, and the plants sometimes grow up as near as three and four inches from each other, according to the spot where the seed fell when sown in this slovenly manner.

The red cotton is used by the Burmese to manufacture a description of cloths of which the women, particularly in the country, make their jackets. It is called *Phyen-nee* or *Pennee*, and does not require frequent washing, a great recom-

mendation here. The *Myè-lat* or middle ground Shans, those situated in the country between Ava proper and the Saluen (Dr. Buchanan's *Mre-lap*,) cultivate more of the Nankeen cotton, and manufacture a better kind of *Phyen-nee*, which they annually bring for sale to Ava. It is in pieces of 60 cubits long and 1½ cubits wide, which sells for 7 ticals, or 9 Rupees 12 annas. The Burmese *Phyen-nee* is often made of the white cotton and dyed. I send herewith two small samples of the Burmese and Shan *Phyen-nee* cloth.

The Burmese call the dressed or cleared cotton *Gwon*, and the undressed *Wa*. It is cleared from the seeds in the same manner as in Siam, by a simple machine called *Kyait* or *Gyait*, consisting of two cylinders revolving close to each other, and moved by a handle. The cotton is drawn between them, leaving the seeds in the hand which feeds the machine. There is a large description also of this machine with iron cylinders, called *Than gyait*, and moved, in addition to the handle, by a wheel and the foot, in the same manner as a knife grinder's engine. The bow, like that of India, is afterwards used, still further to clean the cotton when it is required for spinning; but the cotton, which is exported, has the seed only removed. The person who separates the seed can, it is said, prepare 10 viss or 36 lbs. of clean cotton per diem, and his usual hire is 2 moas or 3½ annas per diem, 300 viss of undressed cotton yields 100 of cleaned cotton. The price of cotton fluctuates from ten to fifteen ticals for the undressed, and from thirty to fifty ticals for the cleaned cotton; which last however has sometimes been so high as 80 ticals per 100 viss. But the average price of 40 ticals per 100 viss, will be about 10 Rupees 14 annas per Bengal maund; and I observe from a Calcutta price current for last month, that the highest priced cotton then at Calcutta, was 12 Rupees per Bengal maund. Captain White mentions, that at Aeng the traders told him that they purchased the cotton for 30 ticals per 100 viss, and that they can sell it there for 65 Rupees. They buy the cotton directly from the planter, and can probably get it cheaper than what it sells for here.

The Nankeen cotton is often mixed with the white from the manner before described, in which the two are planted; and to get a quantity of Nankeen cotton only, a higher price is usually paid for the trouble of separating it entirely from the white. Few plant the Nankeen cotton only. I have sent down to Captain Rawlinson at Rangoon, to be forwarded as samples to Calcutta, 10 viss of each description of cotton. It appears

to me not particularly long in the staple, but very fine and silky, and so I understand it is considered by competent judges. The white cotton I have sent, is the produce of Mendoun, a district on the frontier of Arracan, in which territory also it might perhaps be extensively cultivated. The red cotton is from a place called *Tharet* or *Thayit*, on the western banks of the Irawaddy near Madè (Wood's Sirraip Mess.)

The cotton of the Martaban province, called lately the Tenasserim cotton, appears to me to have a much longer staple than that of Ava, and so does that I saw at Bankok brought from Menan-noi on the frontiers of Tavoy. The Kareans are the cultivators of cotton in the Moulmein province, and their plantations are always, I believe, on alluvial soil, on banks of the rivers or on islands in them, overflown during the height of the rainy season. This seems to be the same description of soil, as that on which the Sea Island cotton of America is grown.*

The Burmese use the cotton seed extensively for lights, particularly in the open air, at their dances and entertainments. Two or three lbs. of the seed with some earth oil are put into a vessel, usually a broken cooking pot, and when lighted they give for several hours a good large flame.

H. BURNEY, *Major*,
Resident at Ava.

Ava, 14*th July*, 1831.

To C. K. ROBISON, ESQ.
Secretary to the Agricultural and Horticultural Society.

SIR,—I am directed by the Honourable the Vice President in Council to transmit to you, for the purpose of being communicated to the Agricultural Society, the accompanying copy of an Appendix to the paper by the Resident in Ava, on the cotton of that country.

2. A specimen of the Thembourwa cotton, as described in the paper now sent, has been forwarded by Major Burney, and will be sent to the Society when received.

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* The finest tobacco in Ava is cultivated at a place called Nga-myo-gyee, a little above Yandaboo, on Islands and on the bank of the Irawaddy, on ground always overflown during the rainy season.

3. A few pods of the Pernambuco cotton adverted to at the conclusion of Major Burney's paper have already been sent to you.

I am, SIR,
Your most obedient humble servant,
GEO. SWINTON, *Chief Sec. to Govt.*

Council Chamber, 4th November, 1831.

APPENDIX TO THE NOTICE REGARDING THE COTTON OF AVA.

Since writing the above, I have discovered in this country a species of cotton called *Thembau Wa*, or ship cotton, which is evidently an exotic, as the Burmese term all countries beyond sea *Thembau Pyee*, or ship countries. At Ava there are only one or two plants, and at Amrapoora ten or twelve, and these appear to be regarded as curious foreign productions; but one of my informants tells me, that the inhabitants of Taroup Myo, a place on the Irawaddy a little below Yandaboo, cultivate this kind of cotton to some extent. The plant is described to me as being perennial, growing to a lofty tree as thick as a man's thigh, and admitting of a man climbing up it. But a young plant which I have seen here, resembles much the *Hibiscus mutabilis*. The leaf and seed are much larger than those of the cotton plant common in this country, and not only are the seeds much more easily removed from the cotton, but the staple of the cotton is unusually long, so much so indeed, that the Burmese find fault with it for this quality, and do not use it for any other purpose than that of making wicks for their lamps. The plant yields the cotton in the Burmese months of Taboung and Tagoo, our latter end of February and March and part of April. With some difficulty I have just succeeded in procuring a little of this description of cotton with the seeds, and I send them together with a leaf of the plant for inspection at Calcutta. If this is not the common Brazil cotton, I should think that the qualities which it possesses of being a hardy, perennial, and yielding cotton of a remarkably long fibre, and most easy to be separated from the seeds, must particularly recommend this species to the notice of cotton planters in India. The seeds are not placed like those in the Pernambuco cotton, of which species there are a few plants at Tsa-gain op-

posite to Ava. That also is called Thembau-wa by the Burmese, who describe it to be a perennial growing to a large tree in this country. Its leaves also are very large.

(Signed) H. BURNEY, *Major*,
Resident at Ava.

(True Copy,)
GEO. SWINTON,
Chief Sec. to Govt.

To C. K. ROBISON, ESQ.

Secretary to the Agricultural Society.

SIR,—In returning to you the letter of the Chief Secretary to Government, dated November 4th, 1831, with the copy Appendix of Major Burney's notice respecting the two different kinds of cotton therein alluded to, as grown in Ava, together with the two several specimens of the said cotton and its seed, which are in connexion with Mr. Swinton's private notes to you severally of the 5th and 13th November last, I beg to make the following remarks:—

1. In regard to the specimen of cotton with the seed attached to it, and forwarded with Mr. Swinton's note of the 5th November, in which note there is also a leaf of the plant.

This cotton it would appear is from Tsa-gain, opposite to Ava, and is in Major Burney's opinion similar to the Pernambuco kind.

I am of the same opinion with Major Burney, and believing it to be of the species called Pernambuco cotton.

The seeds in their contiguous and spiral formation, the fibre of the cotton in its several characteristics, and the leaf of the plant also in its size and appearance, are all confirmative of this opinion.

It may resemble other descriptions of the South America or Brazil cotton trees in its growth; form of seed, &c. &c. viz. the Maranham or Bahia kinds, which I am not acquainted with, but it evidently corresponds with such kinds as we in the Agricultural Society, have seen brought hither and termed as from Pernambuco seed, originally.

The fibre is long, fine, and good: well suited for our spinning machinery; it is readily freed from the seed; it has doubtless been good in strength, but is now from age and transit through alternations of damp and dry climate and in

contact likewise, more or less, with the seed during its course of decay, become impaired in this respect. Such cotton wool in Liverpool in proper condition would be worth from 7½*d* to 8½*d* per lb.

2. In regard to the specimen of cotton and seed separated from it and forwarded with Mr. Swinton's note to you of the 13th November last, together with another paper conveying a leaf of the said cotton plant or rather cotton tree, as well as a leaf by way of comparative illustration of the ordinary cotton plant of the country.

It would seem from Major Burney's report that this cotton is grown in some quantity worth notice at a place on the Irawaddi river, called Taraup-Myo, a little below Yandaboo, and that at Amerapoora and Ava, there are about a dozen trees of it.

Major Burney seems to have an impression that it may be the common cotton of Brazil.

The fibre mainly in its character resembles most the Brazil or South American cotton to the best of my recollection. The leaf of the plant or tree resembles much, and especially in its size, that which we believe to be the Pernambuco kind. But the seeds though in themselves pretty large and bold, are rounder, nor so long as those individually taken, of the Pernambuco kind, and are all detached from each other, in contradistinction of those called the Pernambuco kind. The plant appears to be perennial, and to attain an immense size, the stem of the tree becoming as thick as a man's thigh. I believe that the Pernambuco kind is likewise perennial.

The fibre of this cotton is long, very fine, and good; and is excellently adapted for our spinning machinery.

The cotton is likewise freed from the seed with great facility.

This specimen is doubtless also somewhat impaired in its strength from the duration of time since it was gathered and exposure to variety and change of climate.

I value it in the Liverpool market when in its perfect condition at from 8*d* to 8½*d* per lb. at least.

I would now beg to suggest that the Government be requested to enjoin their enterprizing and intelligent Resident Major Burney, to repeat his enquiries in respect to this cotton tree, both as to the mode in which it is best cultivated in all respects; its average produce in quantity; and how soon it attains to maturity, &c. &c. And that he be instructed to send hither both seeds and young plants at the earliest pos-

sible opportunity in the present year; likewise some seeds of the Pernambuco kind.

I am, SIR,
Your very obedient servant,
JOSEPH WILLIS.

Calcutta, 4th January, 1832.

XXXVI.

ON THE COTTON OF CACHAR.

[*Read 19th August*, 1831.]

To C. K. ROBISON, ESQ.

Secretary to the Agricultural and Horticultural Society.

DEAR SIR,—A few days ago I took the liberty to forward to you by a chuprasee two packages, severally containing specimens of Cachar cotton, and the grain or fruit of the bamboo, which last is used as an article of food in this country, and will be found very palatable if ground down to flour and worked into cakes.

The quality of the cotton will not, I apprehend, be deemed fine, but it is said that the cloth made from it is both warmer and stronger than that fabricated from the cotton grown to the westward. It is not however under an idea of its superiority, that I forward you this specimen, but partly to elicit suggestions for its improvement, and more especially to draw attention to a fine tract of hill land on which it grows, and which lying contiguous to a navigable river, would appear to offer considerable advantages to the cotton grower.

If any farther information on this particular subject, or on the vegetable productions of this country should be desired, I shall be happy to furnish all in my power, and will with pleasure reply to any questions you may address me.

I am, DEAR SIR,
Your obedient servant,
THOS. FISHER.
In charge of Cachar Affairs.

Cachar, 17th June, 1831.

XXXVII.

ON THE VARIOUS SORTS OF COTTON GROWN ABOUT DACCA.

[*Read* 15*th February*, 1832.]

To the Honourable Sir E. Ryan.

My dear Sir,—I have the pleasure to send you a few samples of the cotton produced in this neighbourhood. They are generally discoloured and ill looking from having been kept for months in the smoky huts of the owners; the staple is short and the seeds form an unusually large proportion of the weight of the raw material, but although I am persuaded that more favourable specimens may be produced by careful search among the dealers, yet at the best it will be inferior to the American and Bourbon cottons.

I should have written you immediately on my return from Cherra-poonjee, but the cottons brought me at first were so dingy and poor looking that I threw them aside and had almost forgot my promise, when I saw the notice of the Proceedings of the Society in the Government Gazette a few days ago.

The finer qualities of thread are not now produced, and I am told there has been a great falling off within these few years. I failed altogether to procure a larger quantity of No. 1, which looks so old and black. I suspect it must have been spun by one of Mr. Walters's young girls in the morning of her days, and that now with fingers rigid and sight dimmed by age she is no longer the same Jenny or able to produce the same delicate work.

In the packet I have also sent you a specimen of the Reeha soot from Assam. It is much stronger than hemp; but the fibre, though fine, is not spun sufficiently flexible to make the substance so valuable as its strength promises. It is propogated by slips, I understand, and is used by the Assamese to make fishing lines. I trust that you have perfectly recovered, and now feel no bad effects from the exposure to sun and wet on the hills.

Believe me, yours sincerely,

G. Lamb.

Dacca, 28*th Nov.* 1831.

ON THE COTTON FROM WHICH DACCA MUSLIN IS MADE.

The cotton from which the fine Dacca Muslin is manufactured, is cultivated on both banks of the Megna and Ganges, near their junction and on the low lands between those rivers.

It is an annual plant, and in good soil grows to the height of four or five feet, but it is generally too closely set to admit of its branching out well.

It is sown in October and November. The seeds are wetted for a few minutes, then dropped by the hand into the ground in drills from 16 to 20 inches apart.

When the plant has attained the height of five or six inches, the ground is carefully hoed up on both sides and kept clean by repeated weeding.

The crop is gathered in April, May, and June, and where the situation chosen is beyond the reach of the inundation a second crop, but inferior both as regards quantity and quality, is obtained, but more generally the land is inundated and produces only one crop of from ½ to 2 mds. of undressed cotton from the beegah.

Some of the more industrious ryuts contrive to have a subsiding crop from the ground by sowing rice in the spaces between the drills, a few weeks before the cotton is removed, the rice rising with the water.

The cotton crop does not at present seem to be in favour with the farmers; it is an uncertain one being liable to injury from insects in the early months, from hail and rain when farther advanced, and from being mostly cultivated on low lands, it is not unfrequently destroyed by the river in June before the produce can be gathered.

The cultivation has declined with the muslin trade and the price obtained is now scarcely remunerating; it has fallen from 5 lbs. to 3½ within these few years.

For the finer thread the hand is used in separating the seeds from the cotton; indeed the cylinders employed here are so ineffective and the cotton adheres so strongly to the seed that an active person will do nearly as much work with the hand alone as he can do with the aid of the machine in common use.

Accompanying I do myself the pleasure to send you a few samples of the cotton and of the thread (the better qualities) spun from it. From the enclosed extract from the books of the Custom House, you will perceive that little or no cotton is in-

troduced from Ava. The imports noted as 754, 284 and 3111 mds. include both what is brought by the Burmah boats, and the supply from our own provinces. The imported cotton is only used in the coarse manufacturies, and if there be any considerable importation of cotton from the Ava territories it is absorbed in Chittagong and about Luckipore among the baftah weavers; but I have great reason to believe that the importation is altogether trifling.

Cleaned cotton or rooie passed the Custom House—Dacca.

	Imported.		Exported.	
	mds.	*srs.*	*mds.*	*srs.*
1828-29, ...	19	20	255	17
1829-30, ...	0	14	132	25
1830-31, ...	1	21	50	0

This report does not include the principal import of cotton from the Western Provinces which being covered by Rowannahs from Mirzapore, Patna, or Moorshedabad, is not entered in the books of the Custom House at Dacca.

G. LAMB.

Account of Capause (cotton) passed the Dacca Custom-House, during the years 1828-29, 1829-39 *and* 1830-31.

Years.	*Article.* *Undressed cotton.*	*Quantity Imported.*	*Quantity Exported.*	*Total.*
1828-29.	Capause, ...	754 34 8	5,215 20 0	5,970 14 8
1829-30.	Ditto,.....	284 3 8	6,102 20 0	6,386 23 8
1830-31.	Ditto,....	3,111 34 4	1,839 18 0	4,951 12 4
			Maunds	17,308 10 4

XXXVIII.

REMARKS ON BOURBON COTTON GROWN AT CUTTACK, AND ITS STAPLE FOR SPINNING.

By Mr. J. T. Weekes.

[*Read 9th August*, 1832.]

I have had practical experience in various kinds of cotton since the year 1825, and I am not induced to submit the accompanying piece as a specimen of fine or good cloth, but merely on account of its being the first piece ever made here from cotton the produce of the town. The cotton, which is Bourbon, certainly possesses many good qualities, such as length of staple, and silky texture, but the female Prisoners in the jail

not being in the habit of making thread, it has been turned out of hand in a coarse manner. The weavers of the town also are unaccustomed to make any thing but coarse native cloths. I have immediately adjoining my bungalow about half a beegah of ground containing about 320 plants from which I made last month nine pieces of cloth similar to the one now submitted for the Society's inspection, each piece 1 yard wide and 12 in length, making a total of 108 yards. The expense attending which has been 1 Rupee for each piece in making the thread, and 12 annas each piece to the weavers, total expense 1 Rupee 12 annas per piece, the selling price of which is from 3 Rs. to 3 Rs. 8 as. To induce the Natives of this country to deviate from the beaten track pursued by their fathers a positive advantage must be made to appear in the cultivation of any particular plant with which they are unacquainted, and I am induced to believe that if the fact was generally known in the Upper Provinces that a beegah of land might be made with little trouble to nett upwards of 20 Rs. per annum, that this species of cotton would be generally introduced: the land of my garden is very sandy and inferior, which circumstance added to the fact of the females of a ryut's family being generally available for spinning, brings me to the conclusion that a piece of cloth of equal length and breadth might be made by a Native for 1 Rupee, my calculation then stands thus:

Rent of 1 beegah of good land, ...	Rs.	4
This beegah will contain between 6 and 700 plants, which will produce cotton, annually, for 20 pieces of cloth, ...		20
Total expense to a Native farmer, ...	Rs.	24
Selling price of the above cloth, ...		60
Profit,	Rs.	46
Deduct half for any possible errors, accidents, &c. &c.		23
Nett annual profit on 1 beegah, ...	Rs.	23

My having made 9 pieces from half a beegah of inferior soil without any trouble or care places the correctness of my calculation beyond dispute, and the fact only requires to be made known, by a few hundred notices in Nagree and Bengalee, and distributed to all the Collectors with instructions for publicity being given to them to the Mokuddums and other heads of villages within their Collectorate, to attract the notice of the Native community. I believe there is no difference

between the Bourbon cotton and that denominated Sea Island, and I never saw plants more hardy or require less care. Putting the seed into the ground at the commencement of the rains (which should be well turned up) is the principal part of the labour, in 85 days the plants will be in flower, and cotton may be gathered 9 months in the year, and they will continue 8 or 10 years: mine were planted in 1827, and from the produce I have annually made pillows, bedding, &c. &c. but was resolved during the past season on ascertaining the annual value of half a beegah, which has given the result now communicated. I should observe that at the commencement of the rains of each year I take the shears and clip the plants down to about 4 feet, their average height at the close of the rains will be about 7 feet. I have frequently transplanted them during the rains when in full leaf and bud and saved the gathering. One man is capable of taking care of 2 beegahs. A muster of the cotton accompanies.

JOHN T. WEEKS.

Cuttack, 27th June, 1832.

XXXIX.

ON THE NATIVE COTTON PRODUCED ON THE GARROW HILLS.

[*Read 20th December*, 1832.]

To C. K. ROBISON, ESQ.

Secretary to the Agricultural and Horticultural Society.

With reference to Mr. Secretary Thomason's letter to your address, dated 7th February last, and to the instructions which have been issued to Collectors to communicate with you direct respecting Agricultural improvements, I have the honour to request the favour of your submitting to the Agricultural and Horticultural Society this application to be supplied with as large a quantity of cotton seed not exceeding 12 maunds as it may be in the power of the Society to spare me.

In soliciting so large a supply of seed it is necessary to enable the Society to judge of the propriety of complying with my request, I should inform you that it is my intention to distribute the whole of it amongst the Garrows who you are doubtless aware inhabit an extensive tract of the Goalparah

District at present under my charge, and who are mainly dependent for subsistence on the means of barter which the growth of cotton amongst their Hills enables them to carry on with their neighbours in the plains below, who again export it to the adjoining districts of Assam, Rungpore, Dinagepore, Mymunsing, Dacca, &c. &c. The importance, therefore, of their being supplied with the very best seed, especially at a time when the measures taken to improve the cultivation of cotton in other parts of India, may be expected to throw their inferior produce greatly in the back ground, will be apparent to the Society. To the comfort of those barbarous people the production of such cotton as will meet with a ready market is of vital consequence; to the peace of the country bordering on their possessions it is also a matter of some little anxiety, for it has at times been found that when the Garrows were distressed at home, they hesitated not to descend into more fertile regions; and to the Government even in a financial point of view the subject is worthy of attention, as the revenue realized by a duty on the exports amounts occasionally to more than half a lakh of Rupees per annum. On every consideration it appears most desirable to endeavour to introduce a superior description of plant, and from the success with which I am informed some experiments made by the late Mr. Scott were attended, I think the attempt is likely to be productive of extensive good.

Should the Society think proper to forward to me a large quantity of seed, I propose to have it gratuitously distributed at the different hauths along the foot of the Garrow hills, where the Garrows assemble weekly to sell their produce, or exchange it for that of Bengal; and by dealing it out in small quantities each week I should hope to disseminate it very generally, and if it proved good and yielded a better cotton than that which is now grown, I have no doubt whatever that its seed would be carefully gathered and preserved for sewing next year, so that further assistance from the Society would not be necessary.

It seems scarcely requisite I should add, that whatever kind of seed has been found to answer best in other warm and hilly countries is most likely to succeed here. The climate is much the same as in Bengal and the soil of course as varied as that of a rugged mountainous tract is generally found to be.

As the cold season will soon pass away, and with it the period during which the Garrows frequent the hauths in the plains in greatest number, I beg to suggest that any quantity of seed which it may be resolved to send me may be despatched with the least possible delay. If no better mode presents

itself, it might be made over to Messrs. Colvin and Co. who would forward it to me by an early conveyance.

By this day's dâk I have forwarded a sample of the cotton grown in the Garrow hills in the neighbourhood of Goalparah, which it may perhaps be interesting to the Society to compare with that produced in other districts.

I have the honour to be, SIR,
Your most obedient servant,

A. BOGLE, *Captain,*
Offg. Coll. and Mag.

Rungpore, 29th November, 1832.

Reply to the foregoing Query.

[*Read 20th December*, 1832.]

To C. K. ROBISON, ESQ.
Secretary to the Agricultural and Horticultural Society.

SIR,—I have to acknowledge the receipt of your note of the 11th instant, referring therewith the letter of Captain A. Bogle, Acting Collector and Magistrate in the zillah N. E. Rungpore, dated the 9th November last, together with a specimen of the cotton as now grown in the Garrow Hills near to Goalparrah, for such report as may seem to be useful to the Society.

The specimen of cotton received, is of that description called capass, or the dessee cotton, and which is commonly grown throughout the countries on the eastern side of British India, and also more or less throughout Lower Bengal and some parts of the Coromandel coast.

It is extremely coarse and extremely short in the fibre, and very difficult of separation from its seed—and although strong in its nature, indeed specially so when very fresh, it possesses not another desirable quality for the machine spinner.

The seed is small in size, furred over with a yellowish green fur, but *abundantly* covered with wool.

The specimen tends to exemplify, that the soil and climate of its site of culture would be favourable to the growth of new and better kinds of cotton and which would rank higher in value by from 50 to 100 per cent.

Captain Bogle's letter must be viewed both by the Society, and the Government as a highly interesting document, in as

much, as the extension and improvement of a more useful and more profitable description of Agriculture amongst the people on the Eastern frontier, (now more barbarous than their neighbours) in lieu of one on which they at present appear to be considerably dependent for the supply of the revenue demanded of them, will both greatly ameliorate their civilization and good subjection, and at the same time increase their wealth and means of contributing with greater facility to the revenues of the country.

Captain Bogle wishes to be supplied with about 12 maunds of good kinds of cotton seed, *as soon as possible*, in order that he may, before the expiration of the cold season, distribute it at the various hauts in the plains, which are visited by the hill cultivators during this season of the year, and who would receive it in barter for their other produce.

As there is no newly imported American cotton seed yet in store, I would recommend that the superintendent at Akra be ordered to commence his operations now forthwith, if not already commenced, of freeing the cotton from the seed, lately collected from the Society's plantation, both by the gin and by hand labour, and that he do report to the Secretary in each week, the quantity of seed of each kind in store and ready for distribution, and that so soon as even six maunds of any, or of all of the descriptions collectible, can be made ready and packed, that the Secretary do cause them to be forwarded in proper packages, duly denominating each kind, either through Messrs. Colvin and Co. or otherwise, as suggested by Captain Bogle, to his address, and that the remaining six maunds be sent in a similar manner as soon afterwards as possible; the expence in all respects to be defrayed by the Society.

And at the same time that the Secretary be directed to express to Captain Bogle the thanks of the Society for his present communication, and encourage him to continue in the exercise of that very useful and enterprising spirit which he manifests in this matter, and which promises so well for the future benefit and happiness of that part of the country, which he has been called by the Government to superintend.

I am, SIR,
Your obedient servant,
JOSEPH WILLIS.

Calcutta, Dec. 15th, 1832.

P. S. I have herewith to return Captain Bogle's letter and specimen of cotton.

XL.

FURTHER SAMPLES OF COTTON AND SEED FROM AVA—ALREADY REFERRED TO UNDER No. 35.

[*Read 3d May*, 1832.]

To C. K. Robison, Esq.

My Dear Sir,—I have the pleasure to send you some more of the long staple cotton seed from Ava just received from Major Burney. He writes to me as follows:— "I send you "a further supply of the Brazil cotton seed which Mr. Willis "seems to value most. I hope you will find it good and fresh, "as it has just been gathered. I have not yet been able to "collect any additional information regarding it; but I hope "on my way down to stop at Taroop Myoo and learn. The "Burmese here pay no attention to its cultivation. The cot-"ton is just now fit for gathering."

Yours truly,

Geo. Swinton.

April 17th, 1832.

Report on the above.

To C. K. Robison, Esq.

Secretary to the Agricultural and Horticultural Society.

Sir,—I have to return you herewith the specimen of cotton and seed which you gave to me a few days ago to report upon, being the contents of a dispatch recently received by the Chief Secretary to Government from Major Burney in Ava.

This specimen appears to be of precisely the same description as the one received under Major Burney's previous dispatch that had the consideration of the Society at a meeting held on the 14th January last, and which was stated by him to be grown to some extent by the Burmese people at a place called Taroop Myoo, on the Irawaddy, a little below Yandaboo, being considered by the Burmese of foreign origin, the tree being perennial and growing to so large a size, that the trunk of it is in thickness equal to a man's thigh, &c. &c.

I may aptly refer to my letter to you of the 4th January last on the subject of this cotton, and further now add thereto, the

following observations, as touching the specimen now before me.

The seed is rather round and large, the upper half of it when divested of the cotton, is quite bald, and has a smooth and black or rather brownish coloured skin, like the North America black seed cotton, the lower half is furred all over with a green fur, very tenaciously adherent, like the North American green seed cotton.

This diversity and peculiarity in the seed is perhaps worthy of remark, for I believe that it does not occur in any of the North American kinds, such as the Sea Island, Upland Georgia or New Orleans; neither in the Pernambuco, the Bourbon, the Seychelles, the Tenessarim, nor in the cotton common in lower Bengal called the capass.

The cotton is divested from the seed, both from the bald and furred parts of it, with great and almost equal facility.

The fibre is long, fine, and good in strength, and exceedingly suitable for the machine spinner.

Founding my estimate of its English value by the current prices of such sort of cotton in Liverpool in the month of December 1831, I should say that this cotton would be worth in England from 7*d* to 8*d* per lb. say about 7½*d*. At this rate a wide margin would appear open to remunerate the cultivator, the merchant, and the ship owner, if this description of cotton be found capable of having a successful growth in this country.

I am, SIR,

Your obedient servant,

JOSEPH WILLIS.

Calcutta, 3d May, 1832.

XLI.

ON SOME SPECIMENS OF COTTON IMPORTED FROM LIVERPOOL, WITH PARTICULARS OF PRICES, &c.

[*Read 9th August*, 1832.]

To C. K. ROBISON, ESQ.

Secretary to the Agricultural and Horticultural Society.

SIR,—By the kindness of our friends, Messrs. Daniel and Thomas Willis of Liverpool, we have recently received a variety

of specimens of cotton, the produce of North America, South America, Egypt and the East Indies, together with a statement of the opinions and valuations separately given of them by two eminent Liverpool cotton brokers in the month of October 1831.

We consider that these matters may be found so useful and valuable by the Agricultural Society, that we wish to present them to the Society. We therefore now send them to you accordingly.

The list enclosed will shew you that there are eleven different kinds of cotton; ten of the kinds having each three grades of quality and value, one of the kinds having four grades of quality and value.

We are, SIR,
Your obedient servants,
WILLIS AND EARLE.

Calcutta, 30th June, 1832.

Specimens of sundry cottons as undermentioned, forwarded by Messrs. Daniel and Thomas Willis, of Liverpool, to Messrs. Willis and Earle, of Calcutta, and received per the *Samuel Brown* in the month of May, 1832.

Their several values are affixed as separately estimated by two eminent Liverpool cotton brokers in the month of October, 1831.

ESTIMATED VALUE. *Per Messrs. Salisbury, Turner and Earle, Brokers, Liverpool, October*, 1831.	d.
Sea Island.	
No. 1. Common,	10
2. Good,	13
3. Fine,	18
4. Very fine,	2-6
Egyptian.	
No. 1. Middling,	7¼
2. Good,	8
3. Fine,	9
Orleans.	
No. 1. Ordinary,	5¼
2. Good fair,	7
3. Fine,	8

ESTIMATED VALUE. *Per Messrs. Molyneux, Taylor, and Co. Brokers, Liverpool, October*, 1831.	d.
Sea Island.	
No. 1. Mid. quality, per lb.	10½
2. Good ditto,	13
3. Fine ditto,	18
4. Extra ditto,	2-3
Egyptian.	
No. 1. Ordinary quality,	7¼
2. Fair ditto,	7¾
3. Good ditto,	8½
Orleans.	
No. 1. Very middling ditto,	5¼
2. Good ditto,	7¼
3. Prime ditto,	7¾

ESTIMATED VALUE.

Per Messrs. Salisbury, Turner and Earle, Brokers, Liverpool, October, 1831.

Bowed.	d.
No. 1. Ordinary,	5
2. Fair,	5⅝
3. Fine,	7
Mobile.	
No. 1. Ordinary,	5
2. Good fair,	5¾
3. Fine,	6¾
Pernambuco.	
No. 1. Middling,	7¼
2. Good fair,	7⅞
3. Fine,	8¾
Bahia.	
No. 1. Ordinary,	6
2. Fair,	6⅝
3. Good,	7
Maranham.	
No. 1. Middling,	6¾
2. Fair,	7¼
3. Fine,	7½
Demerara.	
No. 1. Middling,	7
2. Good,	8
3. Very fine,	10
Surat.	
No. 1. Middling,	3⅞
2. Good fair,	4¼
3. Good,	4¾
Bengal.	
No. 1. Middling,	3½
2. Good fair,	4
3. Good,	4¼

ESTIMATED VALUE.

Per Messrs. Molyneux, Taylor, and Co. Brokers, Liverpool, October, 1831.

Bowed.	d.
No. 1. Ordinary quality,	4⅞
2. Fair ditto,	5⅝
3. Good ditto,	6¾
Mobile.	
No. 1. Ordinary quality,	4¾
2. Middling ditto,	5⅝
3. Good ditto,	6½
Pernambuco.	
No. 1. Middling quality,	7½
2. Fair ditto,	7¾
3. Good ditto,	8½
Bahia.	
No. 1. Ordinary quality,	6
2. Middling ditto,	6¼
3. Good fair ditto,	7
Maranham.	
No. 1. Middling quality,	7
2. Fair ditto,	7¼
3. Good ditto,	7½
Demerara.	
No. 1. Fair quality,	7¼
2. Good fair ditto,	7¾
3. Good ditto,	8½
Surat.	
No. 1. Ordinary quality,	3⅛
2. Fair ditto,	4⅜
3. Good ditto,	4¾
Bengal.	
No. 1. Ordinary quality,	4
2. Ditto ditto,	4
3. Good fair ditto,	4⅜

(A true copy.)

WILLIS AND EARLE.

Calcutta, 30th June, 1832.

For the use of the Agricultural Society, Calcutta.

XLII.

REPORT ON THE PRODUCE OF PERNAMBUCO SEED, GROWN BY MR. J. HASTIE, AT DUCKINSORE, ON THE BARRACKPORE ROAD.

[*Read 9th August*, 1832.]

To C. K. Robison, Esq.

Secretary to the Agricultural and Horticultural Society.

Sir,—I have the pleasure to return you the basket of cotton pods, which are a specimen of the produce of Mr. John Hastie's cultivation at Duckinsore, near Calcutta, and gathered as Mr. Mackean says in April last; the same having been grown from the Pernambuco kind of seed, sown in the end of June, 1831, and which seed Mr. Hastie had received from the Agricultural Society.

I have carefully examined this cotton and compared it with real Pernambuco Cotton of middling quality, said to have been worth in Liverpool in October last 7¼ per lb. as per the Liverpool Broker's reports. I think it inferior to it, in fineness, in length of staple, and in some degree also in its strength of staple.

Its colour likewise is rather more pallid.

I hence infer that there is degeneracy. I value it comparatively worth 6¼*d* at 6½*d* per lb.

I have no means of judging of the comparative appearance of pods, the growth of South America and Bengal, but I apprehend that there will be inferiority in size and quality of those of Bengal growth.

Still these pods look pretty well in condition, and pretty full in the quantity of cotton, and if the trees bear them abundantly, there will perhaps remain sufficient encouragement to try further cultivation of this genus in lower Bengal.

If the trees bear as abundantly as those of the "common Bengal cotton" of the Upper Provinces, the value of which was comparatively in Liverpool in October, 1831, from 4*d* to 4½*d* per lb. One would feel justified in recommending further trials in this part of Bengal, of these "Bengal Pernambucos."

It would also be well to have some trials of its cultivation

made in some of the most favourite parts of the cotton cultivation of the Upper Provinces.

I am, SIR,
Your obedient servant,
JOSEPH WILLIS.

Calcutta, 30th June, 1832.

XLIII.

REPORT ON SPECIMENS OF COTTON RAISED BY COLONEL COOMBS AT PALAVERAM.

To C. K. ROBISON, ESQ.
Secretary to the Agricultural and Horticultural Society.

SIR,—I have to report as follows on the two specimens of cotton raised by Colonel Coombs at Palaveram near Madras, and referred to me with his letter addressed to you, dated the 27th September last, for this purpose, by the Agricultural Committee last convened.

Colonel Coombs states these specimens to be the produce of seed sent to him by the Society last year, but he omits to state of what description the seed was.

That one specimen is from plants grown on the hill on which he resides, and which is about five miles from the sea coast, and about 400 feet above the level of the sea.

That the other specimen is from plants grown at the foot of the same hill.

He adds generally that the plants appear to have thriven well, though the season during their growth had been unusually dry, and the ground burnt up.

The specimen of cotton grown on the hill is very good. The file or fibre is long and strong, possessing a good degree of fineness, and it bears the hue of what is termed healthy and well grown cotton; it is likewise gathered in a remarkably clean manner, and would be much esteemed by our machine spinners. I value cotton equal to this specimen, in Liverpool, at 7*d* to 7½*d* sterling per lb.

The specimen of cotton grown at the foot of the hill is of middling quality. The fibre is shorter, weaker and rather finer, (perhaps degenerately so) than that of the hill cotton; neither is its hue quite so good, though in this last respect, it is scarce-

ly to be found fault with. It is not gathered quite so cleanly, as the hill specimen; and in quality generally shews more irregularity than that grown *on* the hill. I value cotton equal to this specimen, in Liverpool at 5*d* to 5½*d* sterling per lb.

The seeds covered with cotton as gathered from the pods and sent by Col. Coombs appear to me to be pretty well covered with the wool, thereby indicating a healthful culture: I detect amongst them both green and black seeds apparently of the North American description, and if so, they have undergone considerable change, and a few likewise of the cotton the common growth alike of Lower Bengal, called Dessee cotton or capas, and of the countries to the Eastward of the Bay of Bengal; and these are probably the Moulmein seeds' cotton of which Col. Coombs makes very appropriate mention in the P. S. of his letter.

The two small packets of seeds, freed from cotton and which are said to belong respectively to the hill and dale specimens of cotton, are not labelled; and having been received by me mixed in one of the packets of the wool, I must return them, without making any further remark, than that if they are descended from either the green or black seeds of North America, they have essentially become changed in appearance by Indian culture on the coast of Coromandel. They now bear more resemblance to Bourbon, than North American cotton seed, in as much as my recollection and judgment serve me to say.

I am, Sir,
Your most obedient servant,
Joseph Willis.

Calcutta, 3d November, 1832.

XLIV.

ON THE CULTIVATION OF UPLAND GEORGIA COTTON AT ALLAHABAD.

By Mr. W. Huggins.

[*Read 21st March*, 1833.]

To Alexander Colvin, Esq.

Dear Sir,—The accompanying cotton was raised from the Upland Georgia seed sent by you to Mr. Matthews in the dis-

trict of Allahabad, and it appears this description of cotton may be very advantageously cultivated in this country, as it requires no more labour than the common cotton of the country. I raised the plants which produced this small quantity by irrigation in the month of May, and as soon as the rains set in, I transplanted them into beds, which I have prepared with two or three ploughings at the distance of five feet each way, but I do not, from what I observed, consider this mode of raising them necessary or perhaps so good as by sowing on the commencement of the rains at the proper distances, leaving the plants to grow up without any interruption, but I would not recommend the American mode of sowing a handful of the seed in each small hole so as to enable the plants to make their way through. As the soil ought to be of a light description (the domot or a mixture of sand and clay) the seeds being single or at most double, easily make their way through, as the soil is always at this time extremely moist. The plants during the rains grow very rapidly and begin to burst their pods early in October. I would not advise transplanting although mine succeeded extremely well, because the interruption tends to throw the plant back at least a fortnight or more, and this is of consequence in the time of gathering. The leaves of this plant are large and not likely to mix up with the cotton, as in the common cotton of the country, I took exactly the same means they employ for cleaning the common cotton, by passing it through the churky or small cylinders, used for separating the cotton from the seed. Topping may or may not be resorted to; it may strengthen the plant, but I think it makes them later in bearing. The produce of these plants is much more abundant than any of the descriptions of cotton I have seen in this country; the pods more than double the size; the quality of the cotton speaks for itself. I have preserved the seed of these plants with the intention of sowing them this season, I have also left the plants which I intend to prune short in February, the results of which shall be forwarded to you.

Your most obedient servant,

W. HUGGINS.

Calcutta, 9th February, 1833.

XLV.

ON THE CULTIVATION OF PERNAMBUCO COTTON AT TAVOY.

[*Read 30th July*, 1833.]

FROM W. MAINGY, ESQ.

MY DEAR ROBISON,—I send you by the *Adelaide*, Captain Steel, a small parcel of cotton grown at Tavoy, the produce of some of the Pernambuco seed which you forwarded to me. It is much valued by the Tavoyers who have again planted every seed that could be collected. They prize it on account of the length of the staple, the facility in separating the seed from the cotton, and the advantage it possesses in being a strong and hardy plant and perennial. I have sent some of this cotton to Mr. Patrick. Do you kindly send me a supply of Pernambuco seed, if you have the means of doing so.

Yours sincerely,

W. MAINGY.

Moulmein, 5th June, 1833.

Report on the foregoing.

[*Read 31st July*, 1833.]

1st. I consider the Pernambuco to be a most excellent specimen of that description. It is both strong and long, and pretty equal in staple, and I should say would readily fetch 7½ at home; (this would be a most desirable quality of cotton for the Gloucester mills.)

2nd. Respecting Mr. Kyd's Saugor Sea Island cotton, I must say, that it far excells any specimen of the kind which I have seen in the country yet. It has all the strength of staple necessary for its length and fineness, and is very equal; and I would say fit for fine spinning; it was worth 14*d* per lb. at least.

I am, yours most respectfully,

JOS. FINDLAY.

XLVI.

ON THE CULTIVATION OF SEA ISLAND COTTON IN THE DISTRICT OF CUTTACK.

[*Read 22d February*, 1834.]

To C. K. Robison, Esq.

Secretary to the Agricultural and Horticultural Society.

Sir,—I had intended ere this to communicate to you the result of my experiment, with the Sea Island cotton seed, which you so kindly supplied me with last year, but it was so unfavourable, that I felt unwilling to confess that my attempt to introduce it had failed, as all those previously made in this district may be said to have done. I had a plantation in my own ground, under my own gardener, the labour being performed by convicts, and at first it seemed flourishing, but the gale of the 21st of October destroyed the whole crop, and the plants have only now come into bearing again. I was thus prevented from making any estimate of the produce or cost of production with reference to it. I am not without hopes however, that the Natives may yet be induced to receive it, and give it a fair trial, from the success which has this season attended those who have tried the foreign *Tobacco* seed. Great loss has been sustained in this district by the cultivators of Tobacco in the last season from an insect which attacked the plant when little above the ground, and entirely destroyed it. Singular to say, the Virginia Tobacco entirely escaped, though equally exposed to the attacks of the grub. Its stronger flavour may be supposed to have preserved it, but the effect has been that the Natives are now as anxious to procure seed, as they formerly were afraid to use it, not at first crediting that it was tobacco, as it had so large a leaf, and fearing it might be poison. Now they find that they can get double the price for it in the bazar from its greater strength making it go so far, and I have been requested to obtain as large a supply of seed as the Society will bestow. A request which I have very great pleasure in forwarding, in hopes that you may be able to comply with it shortly, as next month is the season for sowing.

With this application a demand for cotton seed has likewise arisen; if you can therefore again send me a supply of that

which is fresh, I will take care that it is judiciously distributed; and the desire now existing to obtain it, gives the best guarantee that it will get a fair trial from the Natives themselves, the only mode of ascertaining how far its introduction is really practicable.

Will you oblige me further by stating whether the rewards are still given by Government as published in the Gazette last year, as an additional stimulus would thus be furnished to the Natives.

I have the honour to be, SIR,
Your most obedient servant,
D. PRINGLE, *Acting Coll.*

Cuttack, 27th July, 1833.

XLVII.

ON THE GOSSYPIUM ACUMINATUM OF DOCTOR ROXBURGH.

[*Read 3d April*, 1834.]

MEMORANDUM BY N. WALLICK, ESQ. M. D.

The accompanying seeds and samples of cotton were communicated to me in January and February last by Major L. R. Stacy, from Nusseerabad, where he first discovered the tree producing it in a fakeer's garden, and afterwards met with several others in the same vicinity.

Dr. Roxburgh calls this species Gossypium acuminatum, and says, it is reported to be a native of the mountains in the North Eastern parts of Bengal, and some other parts of Hindoostan. I have heard it asserted confidently that it originally came from Surinam. Be this as it may; the sort is remarkable in as much as it grows to be a tree of 12—16 feet, and is very productive. The seeds adhere together in a very peculiar manner; the cotton is easily and completely separable, milk white, and of a very long staple, but it is harsh and woolly to the touch.

In this latter respect the present specimen differs from the produce of this garden: it is of a soft and silky quality, but not so long in fibre. Major Stacy, in allusion to the peculiar manner in which the seeds in each cell of the capsule or pod adhere together, calls the sort the "cone-seeded cotton."

I take the liberty to recommend the specimen to the examination of those gentlemen among us who have directed their attention to this subject. Some of the seeds are in a healthy and vegetative state; they have sprung up freely with me.

I have also the satisfaction to add some seeds of an ordinary sort of cotton, with the mould, which were kindly forwarded to me by the same zealous gentleman. I believe this sort, too, will be found worthy of the Society's attention.

Botanical Garden, 2d April, 1834.

XLVIII.

ON UPLAND GEORGIA AND SEA ISLAND COTTON.

[*Read 9th September*, 1834.]

Abstract of a letter from Major John Colvin, Engineers.

To Sir R. Colquhoun.

I at first got a small dispatch of Upland Georgia, and Sea Island cotton seed: out of all about a dozen seeds of the former vegetated, of which five plants produced and ripened their pods; with the seeds of these I started the 2d year, sowing it at various places on the canal, all of which thrived well, but the patches were necessarily so small, that I do not pretend to offer any thing like a certain deduction of the quantity of produce, though as far as I can judge the weight produced is at least equal if not superior to that of the common cotton of the country, and in the solitary instance I have of the produce of the 2d year of the plants, it was about double that of the 1st year. The quality is infinitely superior, which the samples will show; altogether I collected about 10 seers of cotton exclusive of seed as the 2d year's produce of the original 5 bearing plants. The specimens are in separate bags ticketed.

No. 1. Grown in my garden at Dadoopore, weighs 17 Rs.

„ 2. Ditto in canal nursery at Jhopor where the Hansi and Rhotuk branches of the canal separate, 20 Rs. wt.

„ 3. Ditto in ditto ditto at Bullee on the Delhi canal, 30 Rs. wt. or one seer.

„ 4. Ditto ditto at Bulee being the second year's produce of the original five plants, 18 Rs. weight.

„ 5. Ditto ditto at Sanghee on the Rhotuk branch, in weight 20 Rs.

In this latter nursery were 22 plants which gave 18 seers

6 chittacks of cotton, and 28 seers 14 chittacks of seed, besides some stolen by the zemindars to secure the seed.

I have also put up nine skeins of thread, the fineness of which is attributed to the fineness and length of fibre and is beyond what the country cotton can produce.

I specially wish to know whether No. 4 is looked on as a falling off in any respect. It did not appear to me to be so, and from it as well as this produce of seed grown here, I am in hopes a permanently valuable addition to the produce of the country has been made.

After sowing season last year came up safe the whole of the large dispatches of cotton seed sent to me, which was distributed in the way sketched out in my original report to Major Benson, which Mr. Robison has. From every where I have the same report, that the black or Sea Island has *no* where vegetated, and that the green or Upland Georgia has done so freely every where, and is now growing, not in one or two, but probably in a hundred villages. In some the excessive rain of the season has destroyed that with the common cotton; but there is abundance safe to prevent the necessity of more Upland Georgia being sent from Calcutta. I have a field of it here which will yield me, I dare say, 15 or 20 maunds of seed.

XLIX.

ON THE CULTIVATION OF SEA ISLAND COTTON IN TIRHOOT.

By Lieut. Col. Hamilton.

[*Read 11th February*, 1835.]

The seed was received in March 1833, in a very dry state; it was steeped for a day, and then kept in manure for some days; it was planted in rows at the distance of about three feet. Only a few of the seeds came up, and arrived at maturity in three months; the rains destroyed the cotton, but in October new buds appeared from which the cotton now sent was partly obtained. The plants were cut over in January and yielded a second crop, and part of the cotton was from it.

The soil was strong, rich, and retentive of moisture. The plant is larger and stronger than the common country cotton, and the flowers and leaves are fully twice as large.

The country cotton is an annual in Tirhoot, it is sown in

June generally along with Indian corn and ruhur, and does not arrive at maturity until the April following.

Little cotton is grown in Tirhoot; what is consumed is principally imported from Mirzapore. I do not think the cultivation of it would answer in that district as it would interfere with the indigo, but I am of opinion that it should answer very well in the new grants at Goruckpore.

Part of the cotton which was from the second cutting is shorter in the staple than the other.

L.

RAW SILK.

From a printed copy forwarded to the Agricultural Society of India by Mr. Geo. Norton, of Madras, in December, 1830.

[*Read 19th January*, 1831.]

The immense extent of the importation of this production from the Eastern part of the world, and the great probability that it will still largely increase, and enable the skill and exertions of our manufacturers to make this country the mart of the world for Silk, as it is for cotton manufactures, are we think sufficient reasons to draw strongly the attention of all those connected with our trade and possessions beyond the Cape of Good Hope.

We will first attempt, in the clearest manner we are able, to describe the climate best adapted for the cultivation of the worm,—how such cultivation is practised,—and the aptest method of drawing from the cacoons or nuts, which the insects spin, sufficient fibres to form a thread.

The climate best adapted for the cultivation of the worm, is the borders of a mountainous or high country; where the air is warm, yet temperate and regular. Thus, the best cultivated in Europe is in Piedmont, the Milanese, and the Tyrol; which countries border on the Alps: and indeed the Silk produced in all parts of the North of Italy, which are mountainous, is good; for there the sky is clear, and the air warm, yet temperate and pure. The worm cultivated in the vallies, where the warmth is great, exudes a looser and more irregular fibre, and the thread formed from it becomes rather harsh and sticky.

The manner of cultivation practised in Italy is as follows:—First, there are the growers of mulberry trees; who, when

the trees have arrived at sufficient growth to allow of the leaves being plucked without injury to them, pluck and sell the leaves by *weight* to the breeders of the worms: of which there are two sorts; first, those who breed to sell the eggs which the worm produces, always reserving a sufficient quantity to keep up the stock; next, those who purchase such eggs, which are also sold by *weight*, merely to feed the animal until it spins it's nut (or cacoon as it is called)—which nut or cacoon, in order to destroy the worm within, (which would otherwise break all the fibres it had spun in easing its way out, when in the course of its various transmutations it would be called by nature again to life and activity) is either baked or suffocated by *steam*. The latter is by far the better method; for without great care in *baking* the fibres of the cacoons get burnt, which creates much *waste*.

These last breeders sell the cacoons, by the weight, to those who draw the fibres from them to form the thread; which is called reeling, or filaturing, the silk. This is performed in the following manner; first, the cacoons ought to be always, and are so in regular filatures, carefully sorted into the various sizes of the fibre upon them; then the quantity of cacoons intended to form the thread is put into a small bason of hot water, which enables the fibres to run freely from them: then the fibres from each of the said quantity of cacoons are passed through an eye in a small wire, extended above the bason of water, in order that in joining together they may receive a slight twist, which gives the thread an elasticity, and the greater such elasticity, the more valuable the Silk. After that, they are fastened to a reel; which is *not circular*, but should be formed of four projecting sticks of wood with even tops to them about one inch broad and four inches wide, with borders at each end to prevent the Silk, in reeling from slipping off; and the extent of such projecting sticks should be such as to form a skein of about 30 inches diameter. Then the reel is turned round, and the fibres drawn from the cacoons until a skein is made. Now, great and particular care must be taken by the person who superintends the cacoons in the bason of hot water to brush them properly with a small birch broom, in order to loosen the fibres, and keep the cacoons clear of the fluff upon them, which, if allowed to run into the thread, renders it woolly and wasty (which is much the case in all Bengal silks) and also to take care that never *more* or *less* than a given quantity be running at the same time, otherwise the thread will become uneven, which unevenness is a very great fault,

prejudices the silk in a very great degree, and essentially spoils it for many purposes of manufacture, as, in weaving, it will show the unevenness in the cloth.

The quantity of cacoons to make a thread are various; and in Company's Bengal silk they are distinguished by letters. Thus, A. I. is 4 to 5 cacoons; that is to say, the thread is formed of not less than the fibres of 4, or more than the fibres of 5, cacoons: A. 2, is 1 to 8 cacoons; B. 1, 10 to 12 cacoons; B. 2, 12 to 14 cacoons, and so on; making as the thread gets larger, a difference of *two*, instead of *one*, cacoons; as, from its size, such a difference will not cause any perceptible irregularity. But, in Italy, in filaturing, or reeling, some of their finest silks, they are so particular and attentive to the *evenness* of the thread, that they will commence with three cacoons, and, when they are run towards the end, they will then add another cacoon; as the worm spins its fibre smaller as it draws to a close.

Next, the situation of the filatures to reel the silk, should be particularly attended to. They should be where the air is pure, temperate, regular, and dry; and in the neighbourhood of good SOFT WATER, which is of the utmost consequence, as none but what is soft, or made so by some means, would do; for which purpose, it would be always better, to have the water drawn into a large cistern, and stand exposed to the sun for some time, in order that it may penetrate and soften it. Indeed, so delicate is the nature of silk, that a cloudy day will have an injurious effect upon it; and the reeling should, if possible, be on such occasions avoided. In Bengal, where they have several harvests, those silks which are filatured in the rainy season, are always much inferior in the colour, more wasty, and loose in the thread.

Now, after paying strict attention that the silk is filatured in the manner we have pointed out, care must be taken to keep each sized thread from the other, to separate the yellow gum, from the white gum Silk, and have each sort, both colour and size, packed in *separate* bales. There is a fault which also attaches to some of the Company's inferior filatures, which is, that a larger reel is made use of than the one we have described, and the long and short reels are mixt together in the same bale. This ought to be studiously avoided.

To sum up all in a few lines,—the valuable properties of silks are, that the colour be clear, and the thread clean, even, and elastic. The *clearness* of the colour is produced by the pureness of the atmosphere in which the worm is bred, and

the care taken to filature the cacoon in a proper situation. The *clearness* of the thread arises from the attention of the person who presides over the cacoons, when in the bason, to keep the water clean, and to brush away all the fluff. The *evenness* of the thread is owing to the regularity of the number of cacoons. And the *elasticity* is acquired by having pure soft water, and keeping it always heated to a degree somewhat beyond tepid.

DOVER AND NORTON.

Great Winchester Street, London.

LI.

ON AN IMPROVED MACHINE IN WINDING SILK.

[*Read 18th April*, 1833.]

Extract from a Letter from Mr. Shakespear to the Board of Trade, 2d June, 1832.

Reporting on the new arrangement of a condition or drying room whereby to improve the means of protecting Raw Silk from damp and of getting up.

1. When last in Calcutta, I met with a pamphlet of considerable celebrity on the subject of the "Silk trade" in which there are some very apposite remarks on the great advantages arising from the public drying, or condition rooms, in Lyons, founded by Government in 1805.*

The Honourable Company's investment at the Gonatea and Rangamatee Factories.

2. Fully impressed with an opinion that the principle, if practically followed up in these factories, would be infinitely beneficial in protecting newly spun Silk from the sudden changes of weather in Bengal, and the extreme humidity of the atmosphere acting upon so absorbent a fibre, especially during the manufacture of the cacoons Silk of the rainy bunds, (which are reeled off with all practicable expedition in their *green* state, or unovened) I have not hesitated to fit up with glass doors, venetians, and shutters, a large old godown at Rangamattee (measuring 40 feet by 30) as "a condition or drying room," in which are placed two pair of my pottery ghye

Condemned in 1828, by the Executive Officer but retained at the suggestion of the present Resident.

* Dr. Lardner in his Cabinet Cyclopœdia does not touch on this material point in the manufacture of Silk.

Simply a water jar of about 2 feet diametre, cut into two parts, which cap the two stoves; each having a valve or smoke pipe to draw off the smoke to the usual circular chimney shaft of the pottery ghye.

stoves having hemispherical tops (in substitution of the cacoon basins). Thus a moderate temperature, by no means oppressive, regulated by a thermometer and ventilater, may at all times be kept up, and the room being glazed, the process of weighing, sorting, and packing, will all be carried on with great security in the worst weather, now altogether impracticable without the certainty of the bales being packed damp, an evil so much complained of at the Export Warehouse, and by the brokers in London. The injury increasing by the heat of the ships hold.

3. The new silk of each day will be hung up in the usual mosses, or bundles of skeins, or distributed on horses and shelves made for the purpose, and thus remain 24 or 48 hours, according to circumstances before being weighed, sorted and embaled. The *decrease in weight* will be very trifling, no factitious practices being resorted to by the operatives in Bengal, as in Europe by the throwsters, to moisten and increase the weight by soap and dirt, which is there paid for as silk by the manufacturer.

Found to average between 2 and 3 chittacks per maund February 1833.

6. I am induced to hope that the effect of this arrangement may prove beneficial to the investment, consequently satisfactory to your Board. And that it may accordingly be brought to the notice of Government as an expedient hitherto I believe never thought of or had recourse to at any of the Honourable Company's Factories.

At the trifling outlay of Rs. 287-15-4, paid for out of the profits on the pottery ghyes.

"Qui non proficit, deficit."

Mr. Secretary Macnaghten's Reply of the 11th of June, 1832, to the foregoing.

"The Board being persuaded that you were actuated by the most praise-worthy motives in incurring the expence of Sa. Rs. 287-15-4 as reported in your letter of the 2d instant in the preparation of a "drying room" at the Rangamattee Fac-

tory, they do not hesitate in the present instance, to sanction that expenditure."

(A True Extract.)

COLIN SHAKESPEAR, *Resident.*

REMARK.

Of the advantages of this scheme I can now speak with confidence: many hundred bales of raw Silk having been packed in the past year, in a state of "*dryage*" and perfection hitherto unknown.

15*th February*, 1833. C. S.

Transmitted to the Society through Government.

To L. R. REID, ESQ.

Secretary to Government.

SIR,—I have the honour to inform you that I have dispatched from Darwar a further quantity of St. Helena silk-worms' eggs to the address of the Secretary to the Bengal Government, Territorial Department.

2. I had found that most of the country worms in and about Darwar were cut off by disease within the last two months, and that the portion of the Italian worms already hatched from the St. Helena eggs had shared the same fate, I therefore took the liberty of sending off the remainder to Bengal as the only chance of saving them.

3. With reference to your letter of the 13th ultimo, enclosing the copy of a communication from the Commercial Resident at Soonamooky. I have to report that I have commenced supplying cuttings of the white mulberry by the letter post as desired, and that I shall continue to do so until I receive information from Mr. Shakespear that a sufficient quantity has been sent.

4. I have to express my thanks to Mr. Shakespear for his remarks on the cultivation of the mulberry in Bengal. The two varieties which I have sent for introduction to Bengal are distinct from those of which Mr. Shakespear was so kind as to forward specimens. The "dasee" or "indigenous mulberry" is cultivated about Poona and in the southern Mahratta country.*

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* Vide Specimen.

The "bedasee" I take to be the same as a third variety I received from St. Helena with entire pointed leaves and a whitish bark. Admitting the *morus alba* and *morus Indica* to be originally specially distinct, I should say that the "dasee" and "bedasee" are varieties of *morus Indica*, and that the larger white mulberry (entire leaved,) and the "doppia foglia" are varieties of *morus alba*. However, the several kinds of mulberry used for feeding worms have been so modified by cultivation, as to render the distinguishing marks between a species and a mere variety, extremely difficult to ascertain. In order to prepare the way for more correct information on this subject, I herewith forward specimens of several kinds of mulberry with an outline of an arrangement of the *genus morus*, which I beg to request may be sent to Bengal for comment or correction.

5. There are two important points yet to be established with regard to the several kinds of mulberry.

1st. What kinds do the worms prefer?

2d. What kinds will grow best as standard trees, and what are the best adapted for the field cultivation on the Bengal plan?

6. It is with a view to decide the above questions that I wish to continue the subject brought forward by Mr. Shakespear. I was before aware of the system of cultivation pursued in Bengal so far as it is published in a work considered as authority "On the Husbandry and Commerce of Bengal," but as there are some crude notions abroad in this Presidency on the subject of mulberry cultivation, a decision of these questions from competent authority and experience may prevent much waste of time and capital.

Bengal cultivation as described by Mr. Shakespear.

7. The Indian mulberry plant is not allowed to rise above a foot and a half or two feet. It is cut twice a day as required to feed the worms. The plant is thus exhausted in about the third year, and it is then rooted out, but is easily renewed by cuttings, and planted in rows with just room enough between to admit of the culti-

Experimental cultivation in Western India.

The mode introduced at Darwar and Poona about ten years since differs but little from that described opposite. The mulberry cuttings are allowed to grow about three or four feet high, and as they are always irrigated, they produce leaves at this height. They are not rooted out under seven years. I am myself convinced that

vator weeding, dressing, and earthing up the roots.

the more frequently this kind of mulburry is cut down, the better and more tender leaves are produced, and that old trees become straggling, and produce inferior leaves. But my experience only amounting to four years, during which time I have cultivated the plant at Dapooree, my authority may be thought insufficient. I therefore beg to submit the proposed Deccan plan for an opinion from Bengal.

Plantations of mulberries dasee, and perhaps also the bedasee, are now forming about Poona and Ahmednuggur upon the (2) Italian plan, the cuttings having struck, are transplanted, and set from 8 to 12 feet apart, and trained up as standard trees, the leaves of which it is proposed not to gather for four years.

8. The following information is desired from Bengal.

1st. Has such a plan ever been tried in the Bengal provinces, and if it has, with what success?

2d. Will the leaves be improved or otherwise, as food for the worms, in this climate, by being produced from old trees?

3d. Provided the trees and the leaves be improved by age, and produce a larger crop as they grow older, still will it be possible with any supposable rate of profit to compensate for the capital of a silk farm lying dead for four years, and in a country where labour is dearer than in Bengal *and irrigation* necessary? I have to remark with regard to the two varieties of white mulberry before mentioned, that they are of much slower growth than the common kind, and will probably make good standard trees. They do not so readily root from cuttings. I have found budding them on the common mulberry the most eligible way of propagating them, as a single bud inserted into a stock serves the purpose of five or six buds sacrificed for a cutting; besides gaining a year's growth by the age of the stock. This is of course only a temporary expedient to

facilitate the quicker introduction of the plant into the country.

I have the honour to be, &c.

(Signed) CHARLES LUSH,
Supt. Botanic Garden, Dapooree.

Dapooree, Poona, 31st January, 1833.

Genus morus.

Species that have been cultivated or proposed to be cultivated *for* feeding silk worms.

§ 1. *Fruit roundish.*

1. *Morus nigra.* The common officinal. Black mulberry (not in India?) used in some parts of France and Italy for feeding worms. The only species common in England.

§ 2. *Fruit cylindrical.*

A. Fruit very long.

2. *Morus latifolia.* Leaves *rough*, variously divided. A large tree common in gardens in the Deccan. The worms do not flourish on it.

B. Fruit short.

3. *Morus Indica.* Leaves *smooth*, entire or divided, heart-shaped, *equal* at the base, fruit deep purple, stem shrubby and diffuse.

Var. Desee.

2. *Badasee.* (Is this *morus Tartarica* of some Botanists?)

4. *Morus alba.* Leaves *smooth*, entire, or divided; heart-shaped, *unequal* at the base. Fruit whitish or *variously coloured*, pink or purple; stem *arborescent varieties;* common simple leaved white mulberry.

2. "*Dopia foglia.*"

The above varieties differ in the form of the leaves. There appear to be others depending on the colour of the fruit.

The cause of the confusion that exists in the nomenclature of species and varieties of this genus, may be traced to the circumstance of Botanists having taken their characters almost exclusively from the leaves. Now it happens that in those species which have not been cultivated for fruit or leaves as

the *Morus Mauritiuna M. Scandens** and perhaps also in the M. latifolia, the character of the leaf is sufficiently marked to determine the species while in those kinds of mulberry on which silk worms are fed, an almost endless variety of leaf may be found. This being the case it becomes of importance that characters should be taken from the fruit, stem, stipula, or parts of the plant. To do this properly every known variety must be procured for comparison, a task which can scarcely be completed satisfactorily by any individual in India.†

(Signed) C. L.

(True Copy.)

(Signed) L. R. REID,
Sec. to Govt.

(True Copies.)

(Signed) G. A. BUSHBY,
Offg. Sec. to the Govt.

(True Copies.)

F. MACNAGHTEN, *Secretary.*

To C. K. ROBISON, ESQ.

Secretary to the Agricultural and Horticultural Society.

SIR,—I have the pleasure to acknowledge the receipt of your letter of the 1st instant, and at the same time to reply to the queries submitted by Dr. Leish to this Government, to the best of my knowledge.

5th Par. of Dr. Leish's letter.—There are two important points yet to be established with regard to the several kinds of mulberry.

1. What kinds do the worms prefer?

2. What kinds will grow best as standard trees?

The kind with the small leaf of a dark colour, rather thick, called double leaf, more difficult to pick and has been

* Both those are growing in the Botanical Garden, Calcutta, and at Dapooree.

† The lately published volume of Dr. Lardner's Cabinet Cyclopœdia "on the culture and manufacture of Silk," is full of loose statements and contradictions regarding the species used in India, China, &c. The inference is that very little is accurately known on this subject.

found to be the best cultivated for the nutrition of silk worms in Italy.

Species Morus alba.

Both the species called Morus alba, of a white berry, and the Morus nigra, of a black berry, with upright large trunks, dividing into large branchy very spreading heads rising twenty feet high and more—further valuable information on this subject may be gained by a reference to the "Treatise of Monsr. L'Abbé Boissier de Sauvages, de la Société Royale des Sciences de Montpellier, de L'Académie Impériale Physico-Botanique et de celles des George Fili de Florence," for the treatment of standard trees refer to pages 35 to 54 inclusive.

2. Cont. What are the best adapted for the cultivation on the Bengal plan?

I think the common "Dasee" Morus Indica is the best adapted for the cultivation on the Bengal plan, (as described by Mr. Shakespear) which is pretty nearly the same all over Bengal; in some places however they strip the leaves off the stems instead of cutting both together.

8th. Par. of Dr. Leish's letter.

1. Has such a plan ever been tried in the Bengal Provinces, and if it has, with what success? This relates to the plantation of mulberry now forming at Poona and Ahmednuggur upon the Italian plan?

I cannot say whether it has ever been tried in Bengal.

2. Will the leaves be improved or otherwise as food for the worms in this country, by being produced from old trees?

In Europe old mulberry trees produce better leaves than young trees and as the trees grow older, the leaves diminish

in size and improve materially, so that they at last attain a very excellent quality, and I should think the same effect would be produced here.

3. Provided the leaves and the trees be improved by age, and produce a larger crop as they grow older, still will it be possible with any supposable rate of profit to compensate for the capital of a Silk farm lying dead for four years, and in a country where labour is dearer than in Bengal, and irrigation is necessary?

3. On referring to pages 349 to 361 inclusive, of Dandolo's Treatise, this question, will be found, in a great measure, to be satisfactorily answered, and will apply equally to this country, as it does to the one where it was written.

The St. Helena silk worm eggs mentioned in the 2d par. of Dr. Leish's letter were received by me in November last, reared and hatched in January and February last; spun their cocoons, became moths, and laid their eggs; which eggs have again hatched, the beginning of this month, and will give a second crop. The worms were fed entirely on the common "dasee" Morus Indica, introduced by me on the farm, and planted and cultivated on the Bengal method. If I could procure some cuttings of the Morus alba, I would give them a fair trial here as standards according to the best methods adopted on the continent.

It is astonishing to observe that no advantage is taken of the wide field open in this country for the improvement in the cultivation of the mulberry tree, more especially the species which is known to be the best adapted for the food of the silk worm either as standards, half-standards, dwarf-standards, or shrubs, and the breeding and rearing of silk worms by those who are properly acquainted with the minutiæ of this particular study, and the fact is that those who do really understand it, do not meet with the proper support and encouragement they require, and when this is wanting no material improvement will ever take place in this branch of Indian commerce.

I remain, Sir,
Your most obedient servant,
J. M. De Verinne,
Superintendent of Akra Farm.

Akra Farm, 6th April, 1833.

Mr. Storm states that there are four kinds of mulberry used for feeding the silk worm in the districts adjoining Calcutta.

The native names are, saw, bhore, dasee and China.

The two first produce fruit (black) but the last two have no fruit. The leaves of the saw are very large but they are not given to the worm till they have passed two goomes.

The leaf of the bhore is small and jagged.

The leaf of the dasee is small and plain, and the China leaf is also small, but jagged at the stem.

The leaves are considered all equally good for feeding the worm.

The mulberry tree is not cut down for 5 years. It is then allowed to grow for 5 years more when it is rooted out.

LII.

ON THE SILKS OF ASSAM BY CAPT. JENKINS.

[*Read 1st July*, 1833.]

Muneeram gives me the following account of the silk of Assam:—

The worm that gives the common fawn-coloured moonga silk when fed on the most common plants, gives a whitish silk, when fed on the leaves of other trees, the plants it feeds upon are named and estimated as follows:—

No. 1. *Champa.**—The silk produced from the worm feeding on this plant gives the finest and whitest silk, used only by the Rajahs and great people, and is called *Champa pattea moonga.*

The thread from 11 to 12 Rupees a seer.

No. 2. *Maizankurry*,† called also *Addakurry.*—The leaves of this tree also give a white silk and is called *Marzankurry moonga*, the old trees are cut down and the jungle about burnt, and the worms are fed upon the tender leaves of the off shoots for one year, when the leaves become too old and hard for the worm.

Silk from 6 to 7 Rupees a seer.

No. 3. *Soom.*‡—This is the common tree in this vicinity, the

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* Michelia.

† Perhaps of the Laurel family, looks marvellously like a willow, though it is most probably not of that genus.

‡ A species of Tetranthera or Laurus.

silk from the worms fed on this give the finest sort of fawn coloured moonga.

Silk 3½ to 4 Rupees per seer.

No. 4. *Soahalloo.**—This is also a brown silk of inferior quality. This plant is most common in Dhurumpore and about Russachokey.

No. 5. *Digluttee.*†—Ditto ditto, but the worms fed on the leaves of this tree increase much in size.

The moonga worm gives broods five times a year, and the cocoon is very large, but thin.

Weight from 5 to 6 grains.

No. 6. *Pattee hoonda.*‡—I could only obtain silk the produce of worms feeding on Nos. 3 and 4, and manufactured into cheap cloths for the lower classes.

The ara or area pat is the produce of another worm and very inferior in appearance to that of the other; though I believe it is equally lasting; the worms are fed in the houses and entirely upon the leaves of the arund (caster oil plant) if they are procurable, and if not, on other trees in the order following :—

Green *Red*

1. *The Ricinus* communis or viridis—v. is a misnomer of Wild : s.

2. *Kisseroo,* a plant I know not as yet.

3. *Bengala aloo,* a common plant, divided leaves like that of the papeeah. I know not its name as yet.

3. *Jathropha manihot.*

4. *The common bair,* Zizyphus Jujuba.

5. *Keora kaura.*§—This I know not.

6. *Gooluncha phool,* Assamese name, the Bengalee *Bherondo,* Iatropha curcas.

This worm produces broods every month, or every month and a half, its cocoon is much less than that of the foregoing. It is smaller in size considerably but thicker, only about a grain lighter. The chuddurs made of this silk are thick and very warm and lasting.

Weight from 4 to 5 grains each.

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* Tetranthera macrophylla.—*Rox.*

† A plant of the laurel tribe belonging to Tetranthera. Hamilton calls it Tetranthera diglottica.—W.

Much the same *(quality of the silk)* as the foregoing.

‡ Laurus obtusifolia.—*Rox.* W.

§ Sapim schiferum. It would be S. bacchatum, if it were not for the glands on the leaves.—W.

N. B. This worm and its produce is noticed by Dr. Buchanan in his account of Dinagepore; vide Asiatic Journal.

Besides these worms they have in Assam the true silk worm which is fed on mulberries.

This silk is from 6 to 8 Rs. a seer according to qualities.

Jorhath, 5th February, 1833.

LIII.

ON THE SOILS PROPER IN THE CULTIVATION OF TOBACCO.

By H. Piddington, Esq.

[*Read 18th April,* 1833.]

In making some enquiries on the subject of tobacco, I have learnt from a gentleman who manufactures cheroots extensively, that there is at the village of Singoor on the Suruswutty river in the Burdwan district,* a small tract of land, not exceeding two hundred beegas, the tobacco raised upon which is considered as nearly equal to that of Arracan by the cheroot manufacturers and paid for, when it can be obtained, nearly at the same price.

I thought it well worth while to obtain a sample of this soil for analysis, together with that of Sandoway, and I now present it together with one of the tobacco soil of Hinglee, the tobacco from which always commands the highest prices in the Calcutta market. The difference in the appearance of these soils is very remarkable.

I am analysing the three soils, i. e. that of Sandoway; that from Singoor, and that of Hinglee; which last may be taken as a sample of a fine Bengal tobacco soil. It is indeed only through an accident that I am unable to present the Society with the results at this meeting. It is worth stating that the only remarkable differences appear to be in the state of oxidation in which the iron exists in the soils; it being in Sandoway and Singoor in the state of peroxide (or red oxide) and in those of the common soils in that of the protoxide or dentoxide (black or grey oxides).

It is worth noticing too that the tobacco soils of the Havannah and the Pillippine Islands, (and Dr. Casanova in his recent

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* About 6 coss from Chandernagore.

communication to the Society corroborates this) are both red soils; that is, soils which contain their iron in the state of peroxide.

I take this opportunity of remarking to members the very great importance of obtaining samples of the soils in which any product is grown; particularly the great staples of cotton, coffee, tobacco, sugar, &c. if from those places where such are raised of superior qualities. I have reason to believe, (and I make the remark particularly with reference to some statements on the subject of cotton which appeared recently in one of the public papers tending to throw much discouragement on the efforts of the Society and of individuals to introduce the culture of this article,) that we have much yet to learn on this subject. I would instance as a most striking fact that the soils of the Sea Island, of Georgia, and the Carolinas are *said* to be wholly calcareous! while that of the district about Calcutta, from Sooksaugor to the Botanic Garden, never contains above 2 or 3 per cent. of lime.

Members who through themselves or friends can obtain for our cabinet specimens of any soils from any country on which choice qualities of any article are grown will render us an essential service. I set down here a few which I have been endeavouring to obtain, hitherto without success.

Cotton Soils.

That from Central and Southern India, known by the name of the "black cotton soil."

That from the Tinnevelly district.

Of the Seychelles.

Of Bourbon and of the Isle of France particularly from the "Quartier du Poudre d'or." At the Mauritius, the cotton of which formerly bore a higher price than the best Bourbon.

Of the Brazils (Pernambuco and Bahia).

Of Georgia and South Carolina, both Upland and Sea Island.

Sugar Soils.

Of the West Indies from the best estates.

Of the Havannah, Brazils, &c.

Of the Isle of France and Bourbon.

Of the Phillippines, particularly from the province of Pampanga.

Coffee Soils.

Of Arabia, Java, the Isle of France, and Bourbon, the Havannah, St. Domingo and Martinique.

Tobacco Soils.

Of the Havannah.
Of Virginia and Maryland.
Of the Netherlands and France.

It is only necessary to take a few pounds of the soil from any part of a field when it has not been manured, and enclose this in a jar, or bottles, or tin box. If two specimens be taken, one at the surface and one at a foot in depth from it, so much the better; two labels, one inside and one on the outside of every specimen, should be always sent.

H. PIDDINGTON.

Calcutta, 16th August, 1833.

LIV.

ON THE CULTIVATION OF TOBACCO IN THE PROVINCE OF CAGAYAN WHICH PRODUCES THE BEST IN THE PHILLIPPINE ISLANDS.

BY COL. JOSEPH DE HEZETA.

[*Read 9th August,* 1832.]

The soil is disposed in beds five or six feet wide, and as long as may appear convenient. They are to have a small ditch all round to drain the superabundant water and to offer a passage to the labourers employed in cleaning the beds from any weed which might spring up. The earth once well tilled, without a single stone or clod, the seed is thrown, mixing it previously with ashes, to prevent (being so very small) its coming up too thick and that the plants may be a little asunder. In seven days the seed vegetates and other herbs will come up with it which are to be immediately plucked up, on the contrary they will debilitate the tobacco.

The seed being so very fine and requiring to be sown in the rainy season would be killed by too heavy showers; to prevent it, this nursery must be covered in such a manner that having the necessary free circulation of air it may yet be protected from the showers. After the plant is grown and the leaves are large, the showers, unless very heavy, cannot hurt it.

Two months after the sowings, more or less, according to the fertility of the soil, the plant will be ready for transplanting and will have six leaves, yet no harm will accrue if by some

accident this cannot immediately be done, and I think it myself advantageous not to transplant until it is nine or ten inches high, because having more strength, it can endure any unfavourable weather that may happen, such as want of rain after transplanting; while the advantage of doing it at an earlier period is only to profit of the first leaves of the stock which are generally spoiled in spite of the greatest care.

Transplanting.

The soil in which the tobacco is to be planted must be prepared with great attention; it must be very clean without any obstacles which may check its progress. There are two species of lands in *Cagayan*, some high and some low; the tobacco should be planted in the proper season that it may have showers in the two first months; after it has been transplanted very good tobacco may be produced from high lands. But as there my countrymen, walking in a hurry, generally arrive late, they prefer the low lands because, although there may be no rains in due time, the moisture the soil derives from the rivers that irrigate it, supply their place. Yet should the plant be totally deprived of adequate rains, the low lands in spite of their humidity would produce but a puny and miserable tobacco.

The earth once well cleaned, furrows are opened about three feet asunder, nine or ten inches deep, and in them the plants are placed at this same distance from each other, so that every plant shall occupy a square yard. When newly planted, they must be well covered with earth, and although not deprived of a due circulation of air, yet the roots are to be sheltered from the sun until they have adhered to the new soil.

From the moment the tobacco is transplanted a great swarm of worms will appear, which unless carefully extinguished, would not leave a single leaf in the largest plantation; and this attention must be incessant from the first to the last day it is on the ground. On some occasions it is necessary to plant the same field thrice or oftener, because what was sown one day is not found the next, the worm having destroyed or concealed it under ground. Against this there is no other remedy, but to transplant again and again until the worm ceases its havock.

After the plant has taken root, there is no more of this danger, but the worm will continue destroying the leaves if every individual plant is not visited morning and evening and the worms are not killed, but sometimes a single visit will do, or one twice a week, according to the abundance of them.

The tobacco fields must always be kept very clean; any extraneous weed hurts it, and must of course be plucked up immediately. To weed the fields and kill the worms from the chief occupation or employment of the planter while it grows. When the leaves are coming forth, some shoots will be seen among them, which it is necessary to destroy, because they would weaken the plant.

Two months after transplanting every stock will have twelve or fourteen large leaves and some small ones at the top. These must be cut off together with the head of the stock that useless leaves may not weaken the plant, but an adequate number of these must be spared for the growth of seed, for although the new sprouts that grow after the tobacco has been gathered give seed, it is of a bad description. This must be gathered off the flower produced by the stock, and for this a sufficient number must be left, of which tobacco may be also gathered, but it will be inferior to that of the plants that have been pruned.

Four months is the common time that the tobacco is on the ground after being transplanted. The planter must endeavour to transplant his in such a season that it may have rains the first two months, and be without them the two last. A shower, when the tobacco is almost ripe, weakens it considerably, and if there is a bright sunshine afterwards, a great part of the crop may be lost, because the leaves acquire spots of white, which shows that the tobacco is good for nothing, while the gold colour specks caused by the rains when it falls upon a plant perfectly ripe show that the planter has gathered it in due time and that it is well seasoned.

All the leaves of a stock do not become ripe at the same time. The first gathered as being ripest are those nearest to the ground, but although the largest, they are generally spoiled. Successively the others become ripe. This is ascertained by the mid rib and nerves beginning to change their colour to yellow near the foot stalk. In this state they must be gathered.

If after collecting the tobacco, it is desired to take advantage of the new sprouts which will grow, the stock is to be cut, leaving it only about eighteen inches high, and three or more sprouts will grow, which although small in size, will prove a very strong tobacco. This is called the second crop at Cagayan.

Preparation.

According as the leaves are gathered, they are to be dried in the shade and stringed in little sticks so as not to touch

each other, while the air circulates freely around. The sun is very obnoxious to tobacco in this state, and it will likewise be very hurtful to air it more than is requisite. It is to remain in the air until it gets a colour, and as in that state the leaves will be very dry and brittle, they are to be exposed to the dew for one night, and in that moist state left to ferment in rows (*bandalas*, a provincial name which appears to signify *rows*.)

Fermentation, if excessive, would be mischievous, as it would rot the tobacco: three days will be sufficient; at the end of them the heaps or rows (*bandalas*) are to be turned up, leaving those leaves that were under now uppermost; it is then fermented for three days more, at the end of which it is pressed.

This operation consists in expurging it of the bad leaves, keeping the good ones in the small sticks and in rows, but well covered to prevent their getting dry.

Pressing once finished, the preparation is completed.

The seed must be gathered when it is well ripe to serve for the next year's sowings.

A true translation from the original.

JPH. DE HEZETA.

Boribary, Rungpore, June 10th, 1832.

LV.

ON TOBACCO GROWN AT DIAMOND HARBOUR.

By Capt. C. Cowles.

[*Read 14th June*, 1832.]

To C. K. Robison, Esq.

Secretary to the Agricultural and Horticultural Society.

Sir,—I have the honour to forward herewith one maund of tobacco, grown at this place from Virginia, Maryland, and Persian seed, the two former furnished to me by the Society in 1830, and the latter purchased at Tulloh and Co's. said to have been grown by Mr. Piddington.

I have tried the above seed in different soils, namely, a light garden mould, with a large portion of soorky and old house rubbish, dug to a good depth, and had a top dressing of the

sweepings of the farm yard and cow houses. A rather heavy loam, highly manured with burnt and decayed vegetable and old cow dung. The third sort was a patch of ground, which when I joined the station was an unwholesome swamp from being from eighteen inches to two feet lower than the surrounding land; the soil appeared to be a hard steril clay and covered with long coarse grass and rushes. As there was a tank near it I cut away one side of it, and threw the soil over the ground bringing it rather above the level. Such was its appearance, (a hard compact marly clay) that I expected no other good from it than that of raising the land so as to throw the water off; contrary however to my expectations, it produced a much finer crop of tobacco than either of the other soils, and with somewhat less manure.

The mode of curing was as follows; if the day promised to be fine, about 9 o'clock, or as soon as the dew was off the plants, they were cut and left in the sun all day, and put under cover at night. The next day the leaves were stripped from the stems, brushed, and laid singly in the sun on canvas or mats, either the whole or half the day, according as they were more or less dry; then laid in the shade to cool; then placed closely in a heap or box, covered with gunnies on which weights were placed: after remaining in that state until the heap acquired a glowing heat throughout, it was again spread out and the leaves doubled and strung on slips of bamboo, (after the Sandoway manner. In this state it was again sweated, and then hung up in the shade to dry for about three weeks or a month: then put out for one night in the dew, and early the next morning placed in a heap to "sweat" once more, and then finally dried.

From what I have observed, I should say that I commenced the sweating process before the leaves were sufficiently dry, on which account many of them have undergone a partial decomposition. I have no doubt, but it would be advantageous, to allow the leaves to remain in the sun at least two days, (taking care not to break their edges which become brittle on the second day,) and in the shade three or four.

In conclusion, I beg to say that I have reason to believe, that tobacco generally will improve in flavour and colour by being kept in a close dry place for eight or ten months.

I have the honour to be, SIR,
Your most obedient servant,
C. COWLES.

Diamond Harbour, the 24th May, 1832.

To C. K. Robison, Esq.

Secretary to the Agricultural and Horticultural Society.

Sir,—With reference to my letter of 25th instant, I regret it will be out of my power to produce a quantity of tobacco sufficient to enable me to be a candidate for the second class premiums in consequence of a severe loss of plant, not then anticipated.

The cost, mode of culture and cure of the two maunds tendered with the above communication as samples for first class premiums are as follow. Produced at Garden Reach from 14 cottahs of ground, the beegah of 80 hauts or 40 square yards.

	Rs.	*A.*	*P.*
Weeding and hoeing, ...	1	4	0
Taking off suckers, ...	0	9	0
Land rent grown on my own land, but say at the rate of 4 Rupees per beegah, ...	2	12	8
Ploughing, ...	0	6	0
Curing, ...	1	0	0
	5	15	8
Deduct for 1 md. 4 srs. of stem, and suckers and cuttings, valued at 8 as. per maund, ...	0	8	9
Cost of 2 mds. or at the rate of 2 Rs. 11 as. 5 pie per maund, ... Rs.	5	6	11

Mode of Culture.

Seed sowed in beds prepared for the purpose on the 6th September, Virginia vegetated the 11th September, Persian the 9th September (both produced at Garden Reach from imported seed) transplanted from the 11th to the 15th October; plants cut from the 1st to the 6th February. The Persian although transplanted at the same time ripened earlier than the Virginia, but the quantity produced, was as nearly as possible the same, viz. one maund of tobacco from 7 cottahs.

Mode of cure.

When cut, the leaves were taken off the stems, placed on a platform in the shade for four days, then suspended on bamboos in the sun for a similar period and exposed to dew, and when in a tolerably moist state sweated during three days by placing the leaves between blankets and applying heavy

weights on the top. After this the tobacco was exposed to the sun for an hour, and then packed. The stem of the leaf being thoroughly dried is in general a good criterion of its being in a fit state to undergo the sweating process.

Should further information be required, I shall be happy to afford it.

Your obedient servant,

G. F. HODGKINSON.

Calcutta, 30th May, 1832.

LVI.

ON THE PROPER SOIL AND MODE OF CURING TOBACCO.

By Dr. CASSANOVA.

[*Read 21st March*, 1833.]

To C. K. ROBISON, Esq.

Secretary to the Agricultural and Horticultural Society.

DEAR SIR,—In reply to your letter dated the 12th ultimo, relating to the process of curing tobacco, I beg leave to submit a few observations on the subject.

The Agricultural process is limited to some practical laws founded on experience, and these are subject to two principal agents, viz. the soil, and the climate. With respect to the former it is the practise amongst all the Agriculturists in tobacco countries, such as the Isle of Cuba, the states of Virginia, North and South Carolina, and in the Phillippine Islands, to select a high and dry piece of land of a siliceous nature, and combined with iron if possible; (chemical experiments have taught me to distinguish the tobacco grown in hot, low, and damp soils of an argillaceous nature, from that which is produced in temperate and high lands combined with metalic substances) and with respect to the latter there are seasons of the year too well known to the planters to need any explanation. The only difference, (if there is any,) depends on the Geographical situation of the place, with respect to its temperature, or in the backwardness or advancement of seasons, and even on the duration of the same, in which circumstances the planter takes advantage of the one or the other.

The influence of a burning climate may be modified by choosing the coolest month of the year, whereas the soil cannot be altered without incurring great expense. I have seen tobacco lose its natural quality and degenerate by transplanting from one soil to another, although of the same temperature, and *vice versa?*

With regard to the culture of tobacco it is absolutely necessary to make what the Spaniards call a *semillero*, or a seed plot; this must be done in a piece of woody land where the young plants may be protected from the influence of the burning sun until they acquire a strong organic structure, and a height of about 9 or 10 inches; they are then transplanted to the field which is previously prepared in the ordinary mode. When the tobacco is ripe and ready to be cut, it is taken to be cured. For this purpose there are two methods which are subject to the climate of the place where it grows. If the operation is performed in a hot country, the tobacco is cured without heat in a house built for that purpose, the dimensions of which are in proportion to the crop to be collected. This house may be built of any materials provided it is airy and water proof. Large pieces of bamboos are horizontally and transversely placed in it from one angle to another on which bamboos the tobacco is hung by the extremity of the stalk with the leaves downwards and near to each other, leaving a space of about 5 or 6 feet from the ground, in order to keep a smoky combustible burning in different places of the room until the tobacco assumes a dark brown colour, which is the indication of its being cured. It is then packed in bundles well pressed and kept in a dry and airy place.

The house which has been built at the Akra farm on my plan with the sanction of the Committee is a mere experiment on a minute scale. The building is — feet square, and — feet high, and contains 300 plants of tobacco now curing; but this shows how it may be cured in larger quantities.

The other method consists in an operation performed without fire or smoke, but with an artificial heat, or with a caloric produced by the tobacco itself; and is used in cooler climates. It consists first of a house adapted for that purpose, the length of which must be greater than its breadth, and of benches of split bamboos placed longitudinally at each end of the building, with a sufficient space from each other to allow a man to pass. These benches may be fixed in the ground, or may be moveable: they are to be 2 feet high, 3 wide, and from 10 to 20, or 30 feet in length, according to that of the tobacco

house, upon which the leaves are piled about 2 or 3 feet high and covered with some thick woollen cloth or blankets in order to make the tobacco part with its moisture. When it has undergone this primary operation, it secretes an extractive substance, which is the resinous part, and in which the aroma is contained; it then changes into a dark brown colour which is a sure sign of its being cured. When this operation is accomplished, the tobacco is hung about the roof of the same house, in which bamboos are previously placed until it is ventilated, and then packed in bundles of about 6 or 8 pounds, which will keep for a long time if not exposed to dampness. The accompanying bundles from Natchitoches, in the state of Louisiana, is a specimen, and has been in my possession since 1827, being then four years old.

I have no hesitation in saying that if the rules mentioned herein are strictly observed, the quality of East India tobacco will undoubtedly improve; and that its culture will in time afford a considerable article of exportation.

I have the honour to be, DEAR SIR,

Your very obedient servant and fellow associate,

J. N. CASANOVA, M. D.

Calcutta, 20th March, 1833.

LVII.

REMARKS ON THE GUM COPAL—CAOUTCHOUC—AND TEA TREES.

BY LIEUTENANT CHARLTON.

Extract of a letter to J. Tytler, Esq. dated Calcutta, 21st January, 1832.

The gum copal tree is found on the Nagah hills, a high range about 40 miles south of the station of Jorehath in Upper Assam; it is described as a large forest tree and the gum as procurable in large quantities. The hills alluded to have never been visited by any European, and owing to the slight intercourse subsisting between the people of the plains, and the Nagah hill tribes, a wild uncivilized race, very little is known of the interior of their country. The gum is not exported by the Natives as an article of trade.

The tea tree grows in the vicinity of Suddiya, the most remote of the British possessions towards the East in Assam,

and adjacent to the Burmah territory some of the Natives of Suddiya are in the habit of drinking an infusion of the dried leaves, but they do not prepare them in any particular manner. Although the leaves are devoid of any fragrance in their green state, they acquire the smell and taste of Chinese tea when dried. The tree bears a flower very like that of the wild white rose, but much smaller.

The caoutchouc tree, which is indigenous throughout Assam, very much resembles the *Ficus Indica*, or banyan, in its growth and appearance. It rises to the height of sixty or seventy feet. On an incision being made in the bark a milk white juice exudes which soon concretes and becomes black from exposure to the air; if put into a phial as soon as secreted, and the air carefully excluded, it retains its fluidity for a length of time without undergoing any perceptible alteration. From the abundant supply of this gum which may be obtained in Assam, the tree growing in the greatest luxuriance throughout the province, I should think it might be applied to a variety of useful and important purposes.

LVIII.

ON A DISEASE INCIDENT TO ULSEE AND OTHER GRAIN.

Extract from a Report of Capt. Sleeman, dated 6th January, 1830, addressed to the Acting Agent to the Governor General in the Saugor and Nerbudda Territories.

In my former letters on this subject I mentioned that I considered the injury to the crops to arise from the depredations of an insect, and though I had examined the insect and its operations with very imperfect glasses, the whole phenomena seemed to me so entirely reconcileable with the supposition of this cause, and with no other, that though determined to avail myself of any future opportunity that I might have of examining it more fully, I had no doubt of the truth of my conclusion, till my attention was lately called by Lieut. Smith to a paper written many years ago on the subject by Sir Joseph Banks; a paper which I had never seen. He attributed the disease to a parasitic fungus, the farina or seed of which is conveyed in the air from the barberry or other tree peculiarly subject to it, and penetrating into the pores of the leaves and

stalks of wheat and other plants, there sprouts, and is nourished by the sap which is thereby intercepted in its ascent to the grain. These pores are shut in dry weather, but open in wet, when they greedily absorb the moisture, which is brought in contact with them, and with it the seed of this parasitic plant.

The whole of the phenomena observed and described by me seemed now as reconcileable with the supposition of the growth of a parasitic plant as with that of an insect; for it is only a fungus instead of an insect feeding upon the sap, and when I discovered that the blight had first made its appearance last year in some fields of ulsee lintseed, I began to believe, that the insects I had seen might be rather the effect than the cause of the calamity, and collected to feed upon these very minute but destructive mushrooms. I gave orders accordingly, that the cultivators should in every village be recommended to watch their fields carefully, and remove every blade of wheat or other plant the moment any red spots should be discovered upon it, as the only means in their power to preserve the rest.

On arriving at my present ground I found that parts of every ulsee field in the neighbourhood had begun to be affected, and that on some the plants were so lately covered with pale red spots as to appear to have altogether changed colour, as you will perceive by the sample forwarded with the enclosed letter; and as the only means we have of preventing the dissemination of this disease over the wheat crops seems to be the removal of the ulsee immediately, wherever it is discovered to be affected, I have thought it to be my duty to give orders to this effect. But orders would be unavailable, were I not to promise, that the cultivators of these ulsee fields should receive a remission of rent upon the lands from which the crops may be removed, since the blight injures but little the seeds already formed in the ulsee, and does not appear till some few seeds upon each plant are formed, as you will perceive by the accompanying sample, so that the proprietor would be sure of reaping something at the harvest, and would not every where be content to sacrifice that little, for the sake of a prospective and speculative advantage to the cultivators of their village in general; nor would the malgoozars every where be induced to enforce the order since they would have to give a remission to the cultivator, though they should have none themselves from the Government. I have therefore promised that a remission shall be granted for all lands from which the ulsee shall be removed in pursuance of this order, and trust that the measure will meet your approbation.

Till within the last few days this was a year of extraordinary promise. The seed time had been extremely favourable, and though the spring crops have in some of the higher and dryer lands of the district suffered a little from want of moisture, they were generally improved by abundant and reasonable showers of rain about the middle of last month; and if they are uninjured by blight, the harvest must be one of extraordinary abundance, while the external demand and price are likely to continue favourable, and enable the malgoozars and cultivators to pay their rents punctually, and to recover a little from that state of extreme poverty, to which they have been unhappily reduced by so many successive seasons of calamity; but if the wheat crops be again destroyed by this dreadful disease, or extensively injured, to collect rents will in the greater part of the district be utterly impossible, and to abstain from demanding them can merely alleviate the misery and ruin in which the people must be inevitably involved.

The greater part of our land revenue is levied from what we term the howelee lands, or those level plains of rich soil, which are flooded during the rains by means of artificial bunds; and at this season of the year present to the eye sheets of wheat and grain cultivation of many hundred square miles in extent, interrupted only by the small villages imbedded in mangoe groves with which they are thickly studded, and where the soil has not been exhausted by over tillage, of almost unparalleled richness. But, unhappily, any disease like the present is very soon and very easily spread over the whole, for the bunds soon disappear under the corn, and nothing whatever remains to intercept or check its progress; while the very facilities of tillage in some parts tend to aggravate the evil; for a man with half a dozen bullocks, which he purchases for forty or fifty Rupees, will sometimes till forty acres of land, for which he pays Government two hundred Rupees rent, requiring the aid of the plough merely to drill the seed into the ground after he has let off the water. He has no other stock except the bunds, which he and his children keep in repair by their own labours, and are unsaleable; when he loses his harvest, he loses his all, and is involved in ruin almost inevitably.

Though I cannot say that I am very sanguine, I am certainly not without hopes that the measure adopted may tend to check the spread of the disease. The people seem fully satisfied that it is the only means available, and have gone heartily to work in rooting up and burying the infected plants, and as

the gram was not, as stated in my former letters, affected last year, it may escape this, though the wheat should be destroyed. I address you thus early on the subject, 1st. to obtain your sanction to the measure I have thought it my duty to adopt; 2nd. that you may yourself inspect the ulsee fields as you return through the district which you must enter in a few days; 3rd. that you may at an early period communicate your apprehensions of further calamity to Government, should you see just grounds to entertain any.

I should mention that the people did last year in several villages endeavour to check the progress of the disease by rooting up portions of the wheat crops that were first affected, but they tried the experiment too late, when, as they themselves describe it, "the winds were become red with the seed, and spreading it over every field." I should also mention the reason why the ulsee crops were not mentioned in my former letters. No field of it came under my immediate observation or was brought to my notice. It was not therefore, included in the instructions issued by me to the people employed in estimating the extent of the injury sustained; and this article of produce was, compared with the wheat of so little importance, that, without orders, they did not venture to introduce it in their report. I now find that the ulsee was last year affected by the disease as generally and still more early than the wheat, and that it commonly is so; and as it may be more subject to it, and is generally sown either among the wheat or around the borders of most wheat fields, it may, if not altogether the source of the disease, be the means of increasing and extending it. And as the cultivators can very easily substitute another crop for it, it may be worth while to consider whether it might not be expedient to prohibit the cultivation of this grain for a year or two. It may retain the disease in the vicinity of the wheat till it reaches that stage in which it becomes capable of receiving the seed of the fungus into the pores of the leaves and stem, and nourishing it with its sap, and till the wind blows in the direction to convey it.

At present not a leaf or a stalk of the wheat is affected though close to patches of ulsee entirely covered with the disease; no ulsee plant is affected till one or more of the seeds have been fully formed upon it. The wind has for some days blown from the eastward, and since it began to do so, the blight has appeared. These are the only phenomena that I have as yet observed worthy of particular notice.

LIX.

REPORT ON COFFEE GROWN BY F. P. STRONG, ESQ. AT RUSSAPUGLAH, AND SENT TO ENGLAND FOR EXAMINATION.

Sir,—The sample of coffee you have sent me, is of a quality between Mocha and the best Bourbon, but probably has been raised from Mocha seed; and by good care in the management the produce of future years may be brought nearer in flavour to real Mocha.

The coffee tastes clean and sweet, and free from any objectional flavour, while it wants strength and richness. There is a speckled appearance, and indentation on the coat of the beans which I cannot account for, and I am unable to get my inquiries on this point answered by friends in the trade, considered competent judges. My conjecture is that the coffee has been allowed to soak too long in water, by which the bean was injured, and that then it was exposed for a long time to the rays of the sun, for it is so highly dried as to be brittle. This mode of drying has preserved it from canker, but it has, I think, tended to weaken, and allow parts of the aroma to escape.

In the West Indies the coffee after having been soaked, is laid on floors covered over to keep off the rays of the sun with the sides open to admit the air and allow the moisture to escape, here (i. e.) in this process the greatest care is required in the constant and regular turning of the coffee till it becomes dry, for if it be neglected, the edges become cankered.

I am, Sir,

Your most obediently,

Wm. Jas. Thomson.

Dunster Court Mincing Lane,
25th July, 1832.

N. B. This coffee will only rate with good common St. Domingo or fair common Batavia, hardly or scarcely with Ceylon, which of late is much improved in the curing,—present value 58, 60, 50, to 52 may perhaps rule next season if the supply be large, but not otherwise, for the demand is now considered to be equal to the product.

LX.

THE PRANGASS PLANT.

Correspondence between Lord W. Bentinck and Muharaja Runjeet Sing Behadur on the subject of obtaining for the Society some Plants of the Prangass.

[*Read 22d February*, 1834.]

To C. K. Robison, Esq.

Secretary to the Agricultural Society.

Sir,—I am directed to inform you, that upon the receipt of your letter to the address of Mr. Macsween, dated the 21st March last, a communication was addressed by his Lordship to Muharaja Runjeet Singh, of which the enclosed (No. 1.) is a copy requesting his Highness to exert his influence to obtain some seeds of the plants required by the Society.

2. His Highness's reply has now been received and a copy of it is forwarded herewith (No. 2,) together with a copy of a letter from Captain Wade, Political Agent at Loodiana which accompanied it (No. 3,) and its enclosures consisting of a Persian treatise on the Prianga plant, and (what is alledged to be) a specimen of the plant itself.

I have the honour to be, Sir,
Your most obedient humble servant,
W. H. Macnaghten,
Secretary to Government.

Fort William, 2d August, 1833.

No. 1.

(COPY.)

To Muharaja Runjeet Sing Behadur.

My honoured and valued Friend,

In my last letter I informed your Highness of my safe arrival at Calcutta, knowing that it would be gratifying to you to hear of the successful termination of my journey.

Within these few days a letter has been received from the Secretary to the Agricultural and Horticultural Society of Calcutta, requesting my good offices to prevail on your Highness to supply the Society with the seed of a certain plant, which, it is understood is cultivated in Cashmere or in some other part of your Highness's dominions. A copy and translation of the letter, is enclosed and I have no doubt that your Highness will readily comply with the request contained therein and give orders for the seeds to be transmitted in the manner pointed out. Captain Wade will be directed to receive them from your Highness when ready and duly forward them to Calcutta.

The Agricultural Society, of which I am myself a member, consists of a number of gentlemen who consult together to encourage agriculture by the introduction of foreign seeds and plants and the improvement of the existing modes of cultivation and your Highness will not fail to perceive that, as the land is the original source of all wealth, this Society which has for its object to increase the quantity and improve the quality of its produce, is highly deserving of consideration and patronage.

In conclusion, I beg to express the high consideration I entertain for your Highness and to subscribe myself,

Your Highness' sincere Friend,

(Signed) W. C. BENTINCK.

(True Copy.)

W. H. MACNAGHTEN,
Secretary to Govt.

Fort William, 23d April, 1833.

No. 2.

(COPY.)

From Muharaja Runjeet Sing, to the Right Honourable the Governor General.

After Compliments.

I have been gratified by the receipt of your Lordship's letter; every word of which bears evidence of the great friendship which happily subsists between the two states.

In respect to the wish expressed by the gentlemen of the Agricultural Society for my assistance in procuring the Prangass plant, and the information which you convey regarding the benevolent objects of that institution, the promotion of which has induced your Lordship to become a member of it yourself, I am delighted to receive these communications, and regard them as evident proofs of the unanimity and concord which reign between us.

Immediately on the receipt of your Lordship's letter, I dispatched orders to my officers at Cashmere, Multan, and the country on the right bank of the Indus, to use their best endeavours to procure some seeds of the Prangass plant. Should I be fortunate enough to find any, depend on its being dispatched to you with every care.

Since receiving your Lordship's letter, I have been making enquiries among the learned men of Lahore, about the Prangass plant and have forwarded to Captain Wade a treatise on a plant called Prianga which they have extracted for me from their medical books. If a dried specimen of that plant is to be had, it will facilitate the discovery of it by my people.

I have sent the sum of eleven hundred Rupees to the Captain for the purpose of being placed, in my name, at the disposal of the Society which is engaged in these laudable pursuits equally beneficial to all mankind.

(A true translation.)

(Signed) C. M. WADE,
Pol. Agent on the late mission to Lahore and Bhawlpore.

(A true Copy.)

W. H. MACNAGHTEN,
Secretary to Govt.

No. 3.

(COPY.)

To W. H. MACNAGHTEN, ESQ.
Secretary to the Government, Fort William.

SIR,—I have the honour to transmit a reply from Muharajah Runjeet Sing to the letter forwarded in your despatch of the

23d of April last, for his Highness from the Right Honourable the Governor General, requesting the assistance of the Maharaja in procuring some seed of the Prangass plant for the Agricultural and Horticultural Society of Calcutta.

The copy of the treatise on the Prianga plant received with the Muharajah's letter is herewith enclosed. I have not attempted to send a translation of it, as it refers to a variety of diseases cured by it which requires the knowledge of a physician to discuss in an intelligible manner. Since the receipt of His Highness's letter, he has sent me a basket of plants which he says have been forwarded to him from Thibet as the Prianga plant. I enclose a stem of it for the inspection of the Society. The Muharajah wishes to know whether it is the plant which is required. An Afghan who happened to be with me when the basket was opened in my presence and has seen the Prangass growing in Turkistan states that it is not the same vegetable production, but another which is found in Cabul and known by a different name. It has a strong scent of onion. My own attention had been directed to the collection of the plant on account of Dr. Falconer, the superintendent of the Botanic garden at Seharunpore, before I received your letter, and I learn that it is peculiar to Turkistan and other regions situated in similarly high and dry latitudes. It is chiefly used as fodder for cattle and is said to be very nutritious and beneficial to their condition. The people of the country are also in the habit of using it as an esculent herb.

Agreeably to the request of his Highness I will forward to the Secretary to the Agricultural and Horticultural Society the sum of eleven hundred Rupees which the Muharajah wishes me to present to it in his name.

I have, &c.

(Signed) C. M. WADE,
Pol. Agent, on the late mission to Lahore and Bhawlpore.

Loodianah, 9th July, 1833.

(A true Copy.)

W. H. MACNAGHTEN,
Secretary to Govt.

LXI.

ON THE TEA PLANT.

By G. W. Traill, Esq.

Extract of a letter to Dr. Wallich, dated Kemaoon, 13th February, 1835.

"I am truly happy to learn that the tea seed has at length made its appearance, as now that the success of the experiment is assured, the sooner we commence the better. Your instructions in regard to the sowing will be implicitly followed, and I trust ere three months have elapsed, to have it in my power to communicate the appearance of the plants above ground. I propose as mentioned in a former letter to confine the sowing to the garden near Almorah, from whence the plants can without difficulty be sent wherever required.

The ginger grown in the lower range of Hills is considered of superior quality. I have accordingly sent for a maund of the finest kind to be dispatched to you in several parcels by bangy. If a further supply be required, I shall have much pleasure in sending it.

The most approved mode of cultivation is as follows: A piece of ground is selected not liable to be flooded, and a trench is dug on the upper side to prevent water flowing over it.

This ground is well hoed, and manured and prepared as for sugar-cane. The manure should be old, and not spared.

In Chyte the sowing commences. The ginger is then planted in trenches about half a foot deep with one foot space between each trench, and between each plant. The earth is then heaped over the trenches as is done with potatoes.

After the planting is completed, the whole field is covered over with leaves so dense as to conceal both the trenches and intermediate spaces. To prevent the leaves from being blown away, long poles or bamboos are laid on them along the trenches. These poles are removed in Asarh, but the leaves are never disturbed until the ginger crop is dug up. To preclude such disturbance, the weeding is made solely by the hand without the aid of spade, hoe, or any other implement.

Grass or straw is not found to answer so well as leaves, but as the latter, if detached would be liable to be blown away, small branches are previously collected and dried for the pur-

pose. Here bunches of oak are preferred, as that leaf is found to adhere to the stem and to last longer than any other; with you, I presume, palm leaves, or mangoe would answer. The hill cultivators are unanimous in ascribing to this covering of leaves, the superior quality of their ginger.

The Sreenugur onions are noted for their size and mildness; when the seed ripens a supply shall be sent to you.

I have to render my thanks for the further despatch of garden seeds now communicated by you; great part of the produce will be reserved for seed, of which a good portion shall be returned for the use of the Horticultural Society. I trust you will not hesitate in employing my services in every way you may have occasion, as I really derive pleasure in being made useful.

LXI.

REMARKS ON ASSAM.

Enclosed in Mr. Hugon's letter to Capt. Jenkins, of the 15th April, 1835.

The sugar-cane is cultivated in almost every village of Assam, each ryut having a small field of it; they seldom cultivate more than is necessary for their own use; they only manufacture it into *goor*, the process of making sugar or spirits is unknown in the province, but these articles are imported from Bengal. Although the cultivation of the cane is less carefully attended to than in Bengal, it grows much superior: I have seen a few fields where more trouble had been taken than is generally the case, which appeared equal to what I recollected of Mauritius.

The Assamese begin to prepare their lands in October and go on ploughing occasionally, till the time of laying it out for planting which is generally in April, some of them sow opium on the land; the canes are out in February and March, the rattoons a month earlier. The ground is laid out in furrows 6 inches deep and 1 foot apart; cuttings from the top of the cane, 18 inches long, are laid down on them at a foot distance from each; 2 inches of soil are lightly drawn over them. Each ryut having only a small field to attend to, they generally wait until after the first showers to plant it. In June the field is levelled, after having been well weeded; in August when the cane

is 2 or 3 feet high the earth between each row is raised at the foot of it; after this the field is very little attended to, beyond driving off wild animals; the leaves as they decay are left to fall off themselves.

They use a different method from the Bengalees in extracting the juice; they crush the cane between hard, coarsely made, vertical cylinders, worked by half a dozen men or buffaloes. The cylinders are about a foot in diameter and 3 feet in length. Several ryuts join in making the necessary apparatus, and working their fields; the whole is transported successively to each man's field. The rent of sugar lands is 8 annas per poora, (more than one English acre); cuttings for a poora of land cost 4 or 5 Rupees. Few ryuts cultivating the sugar-cane for sale, the *goor* made in Assam sells dearer than in Bengal. It is from 2 to 5 Rupees per maund; the sugar imported sells for 12 and 13 Rupees the maund; the rum at 2 or 3 Rupees the gallon. The consumption of the two last articles I think considerable, and on the increase, especially that of rum; the hill people who surround Assam preferring it to spirits of their own manufacture, besides whom there is a large class of people in Assam who use it (including all the Bengalees). The manufacture of spirits is not farmed in Assam as in Bengal.

Indigo is cultivated in small quantity by the Assamese. The following description of its manufacture will show that the accompanying sample is no criterion of the quality which the land might produce; it is sown near the ryuts' houses on high lands in very small patches, in the month of April; they cut it in August; they tie it up in small bundles and leave it to soak (or ferment) for five or six days exposed to the sun, in large earthen pots; they then take out the bundles, and mix a large proportion of lime with the water to make it deposit the fecula; the latter they dry on pieces of cloth. The way they dye with it is by mixing it up with a dilution of the potash made from the plantain tree, with also the residue of fermented rice.

Although the Natives do not make use of the large churs of the Burhampooter to sow indigo, owing to the little of it they require, I am confident these would be as valuable in that respect as those of Bengal. I have seen chur lands over which no inundation had gone for several years: lands high enough, to be worked in June and July, could be procured in any quantity. Upon the whole I should consider Assam similarly situated as Rungpore and Mymunsing.

Any European attempting to form an Establishment in

Assam, should not confine himself to any single line. A small indigo factory with a small sugar plantation, would reduce the expense of both considerably, as he would thus be enabled to have always on service a certain number of workmen. People employed as servants, (that is continually), cost in Assam one-third less than those who are only employed as they are required; these can be had at 1-8, the former at 1 Rupee. Besides these two ways of procuring workmen there is a custom in the country which would prove highly advantageous to a European manufacturer, giving themselves out in bondage for a certain time on receiving a small sum. There is only their food to furnish, and this with a little management would only cost, 10 or 12 annas, at the utmost; and Cacharee families (tribes resembling much the Boonoahs of Burdwan in strength and habits) may be engaged for 10 and 15 Rupees for four and five years; their women and children work on the fields.

Besides sugar and indigo the manufacture of coarse paper would, I am certain, prove very profitable, the consumption of it in the province is daily increasing, and there is not a single sheet manufactured of it; the little they used under the former rule, they got from Bootan; it is much inferior to that of Bengal which is the only one now in use; the price is 50 per cent. above the retail price of the latter province.

For a European possessed of a moderate capital, and who should be on the spot to look after his business, an establishment in Assam of manufacture and trade offers I think, but few chances of failure. In the manufacture of sugar, indigo, and paper he would have in Assam, the following advantages over Bengal; no competition to fear for many years, cheaper labour and materials for building, with the single exception of lime. As we have now discovered lime in two or three situations, I hope we shall soon have it as cheap here as at Sylhet, or from 13 to 20 Rupees per maund, that is where stone lime is absolutely acquired; for "shell lime" he can make himself. The highest tax on land, is on those cultivated with rice; still this is only 1-8 per poora (or about $3\frac{1}{2}$ Bengal beegahs); that on chur lands, and the very highest (where cotton and sugarcane is grown) is only 8 annas per poora.

The articles of foreign export, in which he would have no fear of Native competition or at least could compete with them, are luc moonga, silk, long pepper, gold, ivory. His being able to export direct to Calcutta, would I think make up for the greater aptitude which in general Natives have over

Europeans in treating in the mofussil. These products find their way to Calcutta, after having passed through the hands of several people. The import articles that he could deal in are trifling, with the exception of salt; this last has been so adulterated in passing through several hands that he would find it advantageous to import it direct from the Company's golahs; he could pay most of his out-lay with it at a profit. Although my account of Assam, may appear favourable, I am certain that any person coming to make enquiries on the spot, would find that I am rather within than above the mark, I shall however close my remarks by saying that from the remoteness of the province, the peculiarities of the people, I am of opinion that to a person employing an agent however industrious, instead of being on the spot himself, success would be very doubtful.

Enclosed in Capt. Jenkins's of the 30th April, 1835.

I ought to have said more of the indigo seed, as an article of trade in my last letter. It would be a great thing for Assam if it was once exported. One poora of it can yield 8 or 10 maunds on a very ordinary crop if any one could be found to take it; a proclamation to the ryuts would induce them (next year, it is too late now) to sow more of it for the seed this year. Even they would be careful to collect more of it; it looks to me of the kind produced in the upper provinces the one most in demand in Bengal. The plants are yet too small for me to judge of their difference, if there is any.

Yours, &c.

T. HUGON.

LXI.

ON THE CULTURE OF ENGLISH FURZE AND BROOM IN INDIA.

In a letter from Captain Vincent, to J. Calder, Esq. dated Barrackpore, 12th February, 1832.

It having occurred to me, when in Ireland, that if the common Furze bush could be brought to succeed in this country, very material benefit might result to the Natives from its va-

rious uses, I brought out some seed with me, a small quantity of which I put down under the shade of a south wall, and had the satisfaction soon after, of seeing it come up as vigorously as it could have done in the bogs. As this partial trial was not however calculated to satisfy me that equal success was to be expected in situations exposed to the heat of the sun, I fenced in a small tank (for the convenience of watering,) and having prepared double borders all round with a very small quantity of rich mould near the surface, put broom seed in that nearest the bamboo jaffry, and furze in the other. By watering them every evening, they soon came up; and, without any shade whatever, are thriving daily; particularly the furze which seemed actually to force itself through the clay, rendered tenacious by the heat of the sun acting on it after the night moisture.

Knowing you to be fond of experiments, which have a general good in view, I have taken the liberty of sending you a little of both the seeds; and shall be gratified at some future period, to hear, that through your instrumentality, the Native gentlemen of Calcutta may be convinced of the utility of the furze not only as a fence for paddy fields, but also in superseding the use of cow dung as fuel which would be better reserved for manure.

LXII.

ON THE CULTURE OF GRAPE VINES.

By Captain Sage.

[*Read 9th August*, 1832.]

In July, 1829, I took possession of a small estate at this place, the garden of which contained a vinery in its infancy running North and South, the sides consequently exposed to the East and West—it is 110 feet long, 15 feet broad, and 7 feet high, having on either side eight vines. I am not sure that in 1829 a few bunches of grapes had not been produced, the number however was probably small, as at this time the vines were only two years old. In November of this year, I took down the whole of the vines, pruned them, stripped off such leaves as remained; and spread the branches as far as they would extend over the jaffry work, running some up the side and over the top, and

carrying others horizontally along the sides. The roots were then laid bare, washed, and all filth and scab removed from them. In this manner they were exposed to the cold in the hope of creating an artificial winter, throwing down the sap and destroying for the time, all vegetation; thus giving the vines rest, to enable them in the spring to put forth all their vigour. They remained thus exposed all December and part of January, when they were treated with a composition of fish, goor, and black earth, (from the native distilleries or toddy shops), mixed together and laid round the roots; the earth was then filled in and the vines left to themselves. From absence, I am unable to state when the first buds burst, but on my return in the middle of February, 1830, vegetation was strong and appearances were very favourable. On my return from Sarun the end of March, I found the vines covered from the very ground with bunches; it was a display (ridiculous from excess) such as no one had seen at the station, or in the neighbourhood. I proceeded to thin the vines (not the bunches) and filled three large baskets. The mallee said, he had irrigated them as soon as the young fruit was formed, and every third day, they were well flooded. I saw the vines again the end of May when the fruit was ripe to some extent, the appearance of the vinery was most splendid; according to the mallee's computation there were upwards of 3,000 bunches of fruit on it. The roof looked, from the entrance as if formed of one canopy of grapes. These vines are all of the white or common kind, and I had intended to give the Society an account of the success attending this mode of treatment; but was prevented by the late Dr. Charles Hunter, who was amazed at the quantity of fruit and declared, I had so forced the vines, that it was impossible they should bear the following year. I then determined to give a trial of three years, which including changes of weather, might give an average of success on which the Society could safely rely. In November 1831, as last year, these vines were treated in the same way; the roots bared, washed, and exposed, manured with blood from the slaughter houses, and such dead animals as I could procure chiefly dogs and sheep; and they were exposed to the cold in the same manner, and for the same length of time. The season was unfavourable for fruit, and a blight attacked the young grapes, and nearly half were destroyed. But in proportion to the success of those in the neighbourhood, I had a large crop, upwards of 1700 bunches ripened, and were in size and flavour exceedingly fine. This year I added to the length of the vinery, and planted eight Constantia vines, four

on each side. They were from Sarun about 12 months old, from slips. In November I again had the whole taken down, pruned, and spread out; the roots bared as deep as it was safe to go, washed, and a great quantity of fish given, as manure, and the earth was filled in to obviate the horrible stench, that was thrown out by the fish, nor could I have the roots bared again, although our winter was exceedingly cold and wet; indeed so great was the cold, that February passed without any show of vegetation, and it was near the 8th or 9th of April before they budded. About the 15th of April they were literally covered with blossoms, but at this time we had a heavy hail storm, the stones of great size. I measured one 4 inches and 4-10 in circumference. The young grapes were just set, and the top and west side of the vinery from which the storm came, suffered very much; the bunches and young shoots were broken off, and the vines I am afraid considerably injured; as what would have been the bearing shoots of next year, are mostly broken off; they may still, however, as the plants are very healthy, be prolonged, so as to be available hereafter. In consequence of this storm, the eastern side has nearly all the fruit remaining, and it amounts to 865 bunches. Of the eight young Constantia vines only two have borne, and one has eighteen bunches on the principal stem, and the other seven, though they were only 3½ feet in height.

From the average 1521 of these three crops compared with the produce of other vineries in the immediate neighbourhood, I think it is satisfactorily proved, that allowing something for the vines being young, and the ground, comparatively speaking, new, opening the roots, washing them, and exposing them as much as possible to the cold so that the sap may be successfully thrown down, and vegetation stopped, is the first thing to be done. The next a preparation of good rich manure to be laid over the roots and covered as the spring is about to commence. The branches must also be equally spread over the jaffrey, so that light and heat may have access to the whole. It is also rather an advantage that in constructing a vinery, it should be partially protected from the violence of the easterly gales, for these gales bring the blight, which consists of a great number of small brown iron coloured spots all over the grapes and leaves; the latter wither immediately. The grapes never increase in size after the blight covers them; and while the bunches that have escaped its baneful influence, swell into large luscious fruit, the blighted ones retain the appearance of discoloured peas. We are in great want of good vines at Dinapore,

and if I could procure some good ones from the Cape, I think of trying the hot-house plan, which would bring them into use in March, April, and May, instead of having them destroyed by the rains, which the greater part of the grapes are annually.

Extract of a letter from Captain Grant, dated Munipore, 1st January, 1833.

I planted the American cotton and tobacco seed received last year; the former appears to me much superior to the Munipore cotton, being much softer and smoother to the feel. I have endeavoured to get a piece of cloth made of the cotton, but the Muniporees cannot manage the manufacture, particularly the *spinning part* of the operation, and prefer their own. The tobacco is considered by them a prize, I have distributed it to all parts of the valley. The tobacco formerly here, unless covered in, was destroyed by the frost; the American which I have now in the ground, though entirely exposed, has not suffered though a heavy frost has fallen for the last ten nights.

I am anxious to procure different species of sugar-cane not of the original growth of Bengal or Hindoosthan. If you would have the goodness to send me some addressed to the care of Mr. J. Grose, Senior, Sylhet, I shall consider it a particular favour, and thankfully repay any expence which may be incurred in preparing or packing it.

LXIII.

ON CACHAR HEMP.

By Capt. Jenkins.

My Dear Robison,—In coming down through Dhurumpore, I found the fishermen making their nets of a twine that so much resembled common English twine, that it attracted my notice. On further enquiry, I found it made of what I took to be a weed about their houses, a plant altogether new to me, and perhaps to most of your Agricultural friends. I suppose it to be a species of Urtica, but I send specimens of the dried leaves and flowers by which you will have no difficulty in ascertaining what it is.

The hemp appears to me to be valuable; it is a good long, fine and tough staple, and is readily bleached. The plant has

a large tuberous root by which it is readily propagated with little care, the villagers tell me it is only necessary to plant it above inundations, and just to bank over the stalks each time it is cut, which is two or three times a year. When the country is liable to inundations, the root is taken up and kept in pots.

The hemp is stripped off without steeping from the stalk recently cut, and when scraped a little clean of the outer bark, washed and bleached at pleasure. The name of the plant here is *reah*, and should it strike your Society as being worth any thing, my friend Lieutenant Matthie would supply you with the roots. It seems to me more like good hempen twine than that made from any plant in India and from one small sample I saw well bleached, it would, I imagine, make a very neat canvas. Whether it would be durable must be tried, I suppose it must stand water well from the use made of it here in preference to other hemp, they have the common sun (Crotularia) of Bengal, and also the pat, (Hibiscus?)

In the parcel are some seeds of a very pungent small chilly, which I have found in deep forests, and may perhaps be a wild plant, but the Cacharees are wandering *janur* cultivators, and traverse the earth wildly. The other seeds are of an enormous citron of this place; the citron is an *indigenous* plant of these hills without doubt. I have met it of various kinds in all the forests.

Yours sincerely,

FRANCIS JENKINS.

Rahachokey, Assam, January 11*th*, 1833.

LXIV.

ON THE BEST MODE OF PREPARING SEEDS TO BE BROUGHT FROM EUROPE TO INDIA.

Extract of a letter from Jas. Gibbon, Esq. to C. K. Robison, Esq. dated Calcutta, 7th February, 1833.

Observing in the publication you this day did me the favour of sending me that in your letter of the 13th August, 1829, you say that the distribution of English seeds to the members of the Society has been the cause of uniform disappointment, I beg to offer you the result of my experience with respect to the

mode of preparing seeds to be brought from Europe to this country.

Seeds are dried in England at a heat not exceeding 60 degrees of Farenheit. If dried afterwards at a quarter heat, that of 160 degrees, they lose 8 per cent. in their weight. If seeds dried at 60 degrees, be put into a bottle and exposed to the heat of the hold of a ship, the moisture within them will be set free, and in the next place it will act on the seed and bring on vegetation in a slight degree, but sufficient to destroy the vegetative power of seed, but if dried at a greater heat than that of the ship's hold, no uncombined moisture will afterwards escape, and consequently the seed will not vegetate, but will remain sound for years.

I do not know the exact degree of heat which seeds will bear; I have tried as far as 160 degrees of Farenheit without injuring them, and I am disposed to think that they will bear much more. The above degree of heat is sufficient for every purpose. A common mat kiln is the most convenient method of drying seeds. The bulb of a thermometer ought to be kept on the floor of it to regulate the heat by. I have succeeded by this means in bringing good seeds to this country which have vegetated a year after their arrival, and I confidently recommend the same to the Society. After this process, you have only to guard against external moisture for which I conceive tin cannisters are the best.

LXV.

ON THE GINGER OF RUNGPORE AND THE PROBABILITY OF IMPROVING THE CULTURE OF THIS ARTICLE BY IMPORTING ROOTS FROM JAMAICA.

Extract of a letter from Col. Joseph de Hezeta to Sir Edward Ryan, Kt. President of the Horticultural Society, dated Calcutta, 7th February, 1833.

Having very extensive indigo factories in the district of Rungpore, which produces the best ginger in Bengal, the great demand there has been of late, both for the English and American market has led me to compare its value in London with that of the West Indies, and I find according to the latest price

current that, while that of Jamaica is quoted from £5 to 9 and 10*s* per cwt. and Barbadoes from 48 to 60 shillings, that of the East Indies does not range but from 30 to 36. Yet from the fine grain, the aromatic smell and strong hot taste of the Rungpore ginger, together with the cheapness of its cultivation (for even at the present market prices, it makes a remittance of 2-8 in the Rupee.) I am led to believe that if plants from Jamaica could be procured, we might improve its quality at least so as to vie with that of Barbadoes and insure to this country another extensive article of exportation.

LXVI.

ON THE CELEBRATED MELON OF BOKHARA.

By Lieutenant Alexander Burnes.

To the Secretary to the Horticultural Society of Bengal.

Dear Sir,—I do myself the pleasure of forwarding to you for the use of the Horticultural Society of Calcutta a small collection of the seeds of the celebrated melon of Bokhara, which I brought from that country, under a hope that it might be successfully introduced into India.

From the melons of India we can form no idea of the luscious nature of the fruit as it grows in the plains of Toorkistan, or as we call it Tartary. This melon attains a great size, having frequently a circumference of 2½ and 3 feet; those which are reared in winter are much larger and two of them form a load *for a donkey*. One has a notion that that which is large cannot be delicate, but no fruit in the world can surpass the melon of Bokhara. Those of India, Cabul, and Persia, not even excepting the well known fruit of Ispahan, do not bear any comparison with it. The pulp of the Bokhara melon is about 2½ inches thick, and retains its flavour to the very skin, which is the criterion of superiority with the inhabitants.

Two descriptions of the seed which I now send bear the name of "kokecher" and "ak nubat." The first has a green and yellow coloured skin, part of which is enclosed. The next is yellow, and, as the name implies, resembles white sugar. I send a third parcel or mixture of various kinds. The shape of all these melons is oval and not unlike the water melon of India.

With regard to their cultivation I have to mention, that they ripen in August and September, after being seven months in the ground; they are irrigated and grown with the greatest luxuriance on the verge of the Oxus. So great a quantity of saccharine matter is contained in the melons of Bokhara that molasses, and consequently sugar, may be readily extracted from them.

I beg you will do me the favour of communicating these particulars to the Horticultural Society of Bengal, which I trust will be able to secure the introduction of a fruit into these countries that drew forth tears from the Emperor Baber when he again saw it after a long absence from Bokhara. The passage may be perused in Mr. Erskine's work.

I hope that at a future period I may be favoured with a notice regarding the success or otherwise which attends these seeds. They have been preserved according to the rules of the Natives.

I remain, DEAR SIR,
Your most faithful servant,
ALEX. BURNES.

Bombay, 2d March, 1833.

LXVII.

ON POTATOES.

By CAPTAIN RICHMOND.

To C. K. ROBISON, ESQ.
Secretary to the Agricultural and Horticultural Society.

SIR,—Having, during the past season, attempted the cultivation of potatoes in the garden at Alipore, in different soils prepared for the purpose, I am anxious that the result should be laid before the Society at the next meeting, not as an instance of success, but, in the hope that others may be encouraged to extend the experiments in those districts of the country where that valuable vegetable has not yet been introduced. With this view I submit the following particulars of the culture, premising, that the natural soil of the Alipore garden is so inimical to the production of potatoes, that crops of former years invariably led to disappointment.

A spot situated on the east side of the large tank was selected as the highest and most likely to prove dry, and best suited for the experiment. The ground was first well trenched in the beginning of October, and then manured as follows :—

4 maunds of lime,
6 maunds of kunker, rubbish sifted,
25 maunds of good rotten dung,
} to each plot 84 by 48 feet.

The ground was again dug over, and then laid out in rows, 18 inches apart, 60 feet long by 2 feet wide. The natural soil was removed from each row, to the depth of 9 inches, and filled up with the compost noted opposite to each. The seed potatoes were of a small kind, with two or three eyes in each. They were planted *entire*, one foot apart in the rows, and at the depth of 4 inches.

Date of planting.	*No. of rows.*	*Seed whence obtained, & when vegetated.*	*When ripe.*	*Compost used in each row.*	*No. and produce of each row.*	
1832. Oct. 18th.	1	Country seed, Oct. 28th.	The stalks dried up entirely by the 20th Feb. 1833, and dug up 12th March.	½ Sand, and ½ rotten dung well mixed.	No. 1	10 seers.
	2			½ Sand, ¼ common garden soil, and ¼ good rotten dung, well mixed.	2	12 seers.
	3			½ Sand, ¼ rotten dung, and ¼ light earth from South America, said to contain a portion of salt.	3	3½ seers.
Oct. 25th.	4	Ditto, Nov. 4th.		½ Sand, and ½ common garden soil.	4	6 seers.
	5				5	4½ seers.
	6				6	5 seers.
Nov. 12th.	7	Ditto, Nov. 28th.		Ditto ditto.	7	3½ seers.
	8				8	7¼ seers.
	9				9	5¼ seers.
Nov. 4th.	10	Eng. seed, Nov. 18th.		Ditto ditto.	10	5½ seers.
	11				11	3¾ seers.

N. B. The English seed was presented by Mr. Jas. Lamb, a Member of the Society, by no means a good kind of potatoe, being *waxy*.

From 40 to 45 tubers of the country seed vegetated in each row; the stalks were thin and sickly, compared with the English seed, which came up more regularly, with thick strong stems, and in every respect so healthy in appearance, that if the seed had been planted earlier, and in a soil similar to row No. 2, it is believed that the crop would have been much more productive. As the stalks advanced in growth, they were spread out at equal distances, and heaped up with the soil prepared for each row, until they arrived nearly at maturity, when the tops of the two first rows were pinched off, as an experiment. During the season the plants were occasionally watered.

About the 2d or 3d of February, some of the plants began to wither, and by the 20th of that month, the whole had dried up. Whether this was induced by the southerly winds then prevalent, I cannot venture to say, but I think the circumstance worthy of notice, because any check at a time when the tubers were rapidly advancing to maturity, must have operated greatly against the success of the experiment. Sufficient however may be gathered from the results, to prove, that *early* planting, in *light rich soil*, will produce, in ordinary seasons, a fair crop of good potatoes in any part of Bengal. That the members of the Society may have an opportunity of judging of the quality of the potatoes, I have the pleasure to send herewith five samples, containing about one-half the produce of each experiment, with corresponding tickets attached.

I remain, yours very obediently,

A. F. Richmond.

Alipore, 13th March, 1833.

LXVIII.

ON THE CULTURE OF FOREIGN MAIZE, AS AN ARTICLE OF FOOD IN TIMES OF SCARCITY.

By John Bell, Esq.

To C. K. Robison, Esq.

Secretary to the Agricultural and Horticultural Society.

Dear Sir,—I have the pleasure to send a few ears of Indian corn for any of the members who may desire to have seed.

In point of size and general appearance they fall short of

the original stock, but it must be understood that this parcel is a very small portion of my *third crop*, the successive offspring of a half-ear of New South Wales maize* presented to me by Mr. Hurry on the 22d May last, and from a small supply of American seed, procured from a ship, of which owing to the ravages of the weevil, only very few vegetated; so that I have *not yet* had the advantage of *season*, although three continuous crops have been produced from *unripe seed* within nine months.

These several crops have been unassisted by manure or irrigation.

I mention these particulars, as I believe that the natives only reap one harvest from the desee Indian corn, during the year; and in a country where the great mass of population is almost wholly dependant on the rice crop, the introduction of maize on a large scale, might, I think, be successfully followed up, without more labour than the operation of planting between the stubble, when the paddy is cut.

The proper season for planting maize in Bengal, appears to me, about the middle of April.

The corn should be steeped in water for 12 hours, then buried in a cloth under ground, until the germs appear. Three seeds planted in each hole about 4 feet apart, will be found a proper distance.

I am, DEAR SIR, your obedient servant,

JOHN BELL.

Alipore, 19th March, 1835.

N. B. Names of parties to whom parcels of the above corn were sent by Mr. Bell, with directions for its culture, at the suggestion of C. E. Trevelyan, Esq.

1. To Capt. Sleeman, Asst. Govt. Agent,	Saugor,	In January, 1834.
2. To C. G. Mansell, Esq.	Agra,	
3. To R. Neave, Esq.	Delhi,	
4. To J. G. Bruce, Esq.	Culpee,	
5. To Newab Fyz Mohammed Khan,..	Delhi,	
6. To Capt. Dixon in charge of the Magazine, ...	Ajmere,	February, 1834.
7. To J. Wilkinson, Esq. Political Agent, ...	Kotah,	

Produced in Mr. Hurry's garden from imported seed.

The only acknowledgements of these dispatches are as follow:—

Extract of a letter from Capt. Sleeman, to Mr. Bell, dated Saugor, 15th February, 1834.

"I have received the Indian corn you have been so good as to send me, and feel particularly obliged by your making me the medium of so interesting an experiment; I will have them sown as you suggest, and make you acquainted with the result. The grains are certainly much finer than any I have seen in this part of the country."

Extract of a letter from Capt. Dixon, of Ajmere, to C. E. Trevelyan, Esq. without date, received — October.

[*Read 14th October*, 1835.]

"Two years ago you were good enough to send me a small parcel of American Indian corn* a portion of which was duly distributed among the residents; some to zemindars in the Ajmere district, and the rest was sown in my own garden. Whether that given away was sown or came to maturity, your deponent knoweth not,† but from my own garden, I had a good return, which allowed of my making liberal donations to the Marwar Thakoors assembled at Ajmere last year, and to the nobility of our own district, leaving seed for a beegah to be sown at home.

"I have brought part of the produce with me here‡ and the inhabitants of Rob Roy's country (otherwise Mhairwarrah) are quite delighted with it, never having seen the like even in a dream.

"In the course of two or three years, I hope this superior produce will altogether supersede the desee Mukka. The American seed I reckon 20 per cent. in return better than that of the country, so that by its introduction, we shall be benefiting the ryuts as well as the Government, seeing the revenue is rated according to the produce. So much for Indian corn.

Notes by the Editor.

* The parcel alluded to in the foregoing list.

† It is to be feared that most of the other original parcels sent, met with similar neglect.

‡ Captain Dixon writes from Mhairwarrah, where he is now Political Agent.

LXIX.

ON TAPIOCA.

To C. K. Robison, Esq.

Secretary to the Agricultural and Horticultural Society.

Dear Sir,—I have the pleasure to submit to the Society, a sample of what I shall term "*Tapioca powder*," to distinguish it from *Casava flour*, since by the method I have prepared it, it will not be readily recognized as the Tapioca of Commerce, nor as the common Casava flour, although possessing the properties of both.

You will perhaps recollect that I applied to you sometime ago for a few plants of the Casava, (Jatropha Manihot,) and that you gave me a note to Mr. Andrew from whom I received on the 15th May last, fourteen stems. These I planted five feet apart in light sandy soil, and have derived abundant produce from them, indeed I might probably have had more, but being anxious to extend my cultivation, I lopped off from time to time the branches of the original plants, without reference to the injury they thus sustained in their progress to maturity.

The roots were equal in size to any that I have seen in the West Indies. I had them washed and stripped of the rind, then ground to a pulp, which was thrown into a clean cloth, and the acrid poisonous juice well wrung out. The pulp thus partially deprived of its impurity was exposed for a few hours to the influence of the sun, by which any remaining juice was successfully taken up. The mass was next mixed with clean water, (much in the manner of arrow root,) strained, and the pulp thrown away. The milky substance thus obtained was allowed to settle, when the clear water was carefully drawn off, and the subsidence again and again watered, until it became perfectly firm and white; it was then put in the sun until quite dry, crushed, and passed through a muslin sieve.

The labour incurred by this process, is trifling; and considering the very high price of Tapioca, and the difficulty of obtaining it fresh and genuine, I think that its introduction in India would be attended with benefit, in as much as a wholesome and nutritious article would be placed within the reach of all classes, whereas, dependant as we now are on foreign

markets, thousands of invalids and children are wholly debarred from purchasing Tapioca, which is procurable only in small quantities at an expense beyond their means.

To use this powder, it is only necessary to mix up a table spoonfull with cold water into a paste, then pour *boiling* water, stirring it all the while, and put it on the fire for three minutes, when it will become a fine transparent jelly, whereas the Tapioca in grains, requires a very long time to dissolve by boiling. It will afford me great pleasure, if this communication is acceptable to the Society, and may be the means of drawing attention to further enquiry, touching an article so much esteemed.

Your obedient servant,

JOHN BELL.

Calcutta, 17th April, 1833.

N. B. I have since cultivated the Manihot in several other spots of ground; but find that a rich heavy soil will not answer.

J. B.

LXX.

REMARKS ON THE STATE OF AGRICULTURE IN BEHAR.

BY JAMES GIBBON, ESQ.

[*Read 21st March*, 1833.]

The following is intended to present a short view of the state of agriculture in the Province of Behar, comprising the districts of Behar, Shahabad, Tirhoot and Sarun, under the following heads. The price of labour; domestic animals; impliments of agriculture; fallow; particular crops; rotation of coops; the defects of the present system, and finally improvements suggested.

The price of labour is somewhat complicated. The ploughman receives daily 3 seers of 48 sicca weight of coarse grain, such as barley or Indian corn, in value about two pice. He also has the use of his master's plough and oxen one day in four, with a portion of land, and at harvest he is allowed for reaping, a sixteenth part of the produce. At this busy time his family follow to glean, and notwithstanding the utmost vi-

gilance of the employer, some stalks are left uncut, others are purposely thrown aside, and in fine all gathered by his wife and children. The labourer also claims and obtains assistance from his master, in defraying the expence of marriages in the family. He is always deeply indebted to him, and is completely at his call when wanted. The cattle are worked generally six hours a day, after which the ploughman is master of his own time. The state of slavery where it exists, is very mild, and in no wise different from that of the hired labourer, who is completely bound by the debt incurred, as the other by the price paid for him. The slave is indeed treated with more indulgence, and is oftener employed in domestic offices, and is generally brought up like a child of the family. Were any degree of severity shown him, he would certainly run away, which very seldom happens. The village blacksmith and barber also receive a certain portion of the produce of each field. When these are employed by the indigo planter, the ploughman has per day four pice, the carpenter, blacksmith, and bricklayer, two annas. Whilst the labourer in England consumes two-thirds of his earnings on food, here they rarely exceed one-third. As an example, bricklayers were sent for to a distance, and one rupee advance was made to each. On their arrival, they said that they had left the advance with their families, and now required another for their own expences. This was not agreed to, but credit was given them with a bunea for their daily expences, and two pice to each man was fixed as all that they required. These were Mahomedans, who are considered more extravagant than the Hindoo in their living. The labourers of this country are submissive, obedient, and respectful to their employers. When encouraged and looked after, they work well and diligently; but if they are not attended to, no kind of severity will induce them to labour. Their strength when compared to that of the European labourer, will be nearly in the proportion of their respective weights. Every one has observed the fatigue and heat which the palanquin bearers and boatmen endure. A bangy burdar's common load is 30 seers which he carries 26 miles, but any of them would carry a maund that distance. In Tirhoot, the price paid for throwing up embankments on the great Gunduck is at the rate of 1 Rupee 10 annas per 100 cubic sicunderee yards of excavation, which was also carried 9 yards to the embankment. The Nonea cast is employed in this work in which they are very expert. They use a very heavy hoe to dig the earth and a strong wicker basket to carry it in. One man excavates or carries 10 yards

a day. The secunderee yard is 33 inches in length. The same labour in England would cost £2 10*s*. per 100 yards.

The cattle of this country are distinguished from those of Europe by a hump on the shoulder, and by being one-fifth shorter in proportion to their height. The breed seems to be every way suited to the mode of cultivation and the scanty pittance of coarse food provided for them. They are capable of enduring long and severe labour under excessive heat, and when properly trained are perhaps the most active of their kind. Under the management of the Digah farm, the beef might bear a comparison with that of England. Their defect is that of the cows being bad milchers. This cannot be remedied but by improving their food. No other breed could exist upon the scanty portion of broken straw which falls to their lot. The first cross with an English bull considerably remedies the defect alluded to, but these being favourites, have always some increased attention paid to their food. In the trials which have been made, the cross between the English bull and the country cow, has proved preferable for milk, to that between the English cow and country bull. The quality of the milk from the country cow is excellent, producing a sixteenth of its weight of butter. The calves keep in good condition while they receive the whole of it, although the quantity rarely exceeds three quarts. This animal is held in great veneration with the Hindoo; the bull is consecrated and is permitted to feed at large, and it is probably owing to this more than to any other cause, that the breed continues so perfect under circumstances approaching to starvation. The breed will increase in size with the improvement of their food, and they have been found to degenerate when the larger breeds from the north are taken to the south side of the Ganges where there is less pasture. When these animals become old, one rainy day in the cold weather will leave the fields strewed with hundreds of them, not being able to resist at once the united attacks of age, of cold and hunger.

The buffaloe comes next. This animal perfectly remedies to the Natives the defect of the cow as a milcher. A good buffaloe will yield ten seers of milk at two milkings and of a quality richer than that of the cow. This is known by its producing a greater quantity of ghee. As little can be said respecting the dairy; a few remarks may not be misplaced here. The Natives do not use butter until melted and clarified, when it is called ghee. The butter is made from the whole of the milk, churned after it has become sour and thick.

It is whiter and softer than that of the cow, and consequently less esteemed. Ghee properly clarified will keep without rancidity for more than twelve months. Many Europeans express their dislike to this aliment, but this is entirely owing to the clarification not having been made until the unseparated curd had already begun to act offensively. Some efforts have been made to produce cheese, both from cow and buffaloe milk. It is generally curdled with kid runnet. About ten years ago, there was some of an excellent quality made at Hansi, and this encourages the hope that it may be made every where. The male buffaloes are quite neglected. The greater part of them are thrown away at their birth. Those which are kept from compassion, have but a small portion of milk allotted to them until they are able to pick up herbage, when they are left to shift for themselves. They are never castrated, and when grown up are sold for from two to four Rupees each. In the month of September hundreds of them are sent from the North of Tirhoot to Dacca, for sacrifice. In South Behar this animal is used during the rains to prepare the paddy lands. The surface of these lands is covered with water, and the object is to form a thick mud by frequent stirring with the plough. When the buffaloe is overpowered with heat, to which he is very liable, the ploughman cools him by throwing water over him. He neither stands the heat so well as the ox, nor has he the same activity. On comparing the frame of the two animals, if we assign greater strength to the buffaloe, he cannot exert himself so long, and as a labouring animal is much less esteemed than the ox. The buffaloe is of all animals the most domesticated. He comes at the call of his keeper, is perfectly obedient to the smallest child, who sometimes sleeps on his back whether ruminating or grazing, and he has been known to return to the defense of his herdsman and drive away a tiger that had assailed him. The buffaloe is satisfied with the coarsest herbage. He eats the coarse grass used for thatching and does not refuse the leaves of the Palma Christi, when a little decayed. With the ox for labour and the buffaloe for the dairy, this country may be considered to be amply provided with cattle. I believe that the beef of the buffaloe has never been fairly tried. The female is too valuable to be killed, as a good one is worth 25 Rs. and the male has never been emasculated, and never fed. It is not generally known that the camel produces abundance of milk which is sometimes made into ghee.

The sheep can hardly be regarded in this country in an

agricultural view. Sometimes a shepherd is paid to induce him to keep his sheep during a few nights on a field in preparation for poppy, or when the seed of paddy is sown before being transplanted, but no such thing has ever been tried as that of cultivating a green crop with the intention of feeding it off to manure the land, or for the purpose of soiling. These points, from which in England so much benefit is derived, are still left for experiment in this country. Sheep are here less esteemed than goats, but the prejudice is not so strong, but it may wear off. A fed sheep seldom weighs above ten pounds a quarter. The fleece is shorn twice a year, and weighs half a pound.

There seems to be a general prejudice against the hog of this country, even by Europeans, and this extends towards him when cleanly fed. He is not yet perfectly domesticated, and does not thrive well under confinement. One that escaped from a sty, and was permitted to remain at large in a sugar cane field for three months, became perfectly wild and exceedingly fat.

The implements of agriculture, which have been for ages in use in this country, are well suited to the size of the labouring animals, and still more to the narrow means of the humble ryut. Probably when the matter is examined, it will be found that under any circumstances to be met with in India, there are no implements yet invented that would answer so well. The most esteemed ploughs in England are for the double purpose of stirring the earth and laying it up in lands, in order to draw off the superfluous water. Here the lands, whether alluvial or deluvial drain naturally so well, that this forming into lands is unnecessary, there being no wet land except what is actually inundated. However ineffective the single operation of the plough of this country may appear, yet when we compare the frequent stirrings to prepare the land, to the combined ploughing and harrowing which are required in England, and the vast disproportion of the strength and expence of the team, we shall not find that we have much superiority to boast of. The price of a Behar plough complete, including an iron share, weighing 8 lbs. is 2 Rupees. The team, or two oxen, that would weigh about 3 cwt. each, cost 16 Rupees. From ten to twenty days labour according as two or four bullocks are employed, prepares the land, one beegah, nothing inferior to the best English fallow at an expence, when hired ploughs are employed, of from 1 R. 10 as. to 2 Rs. 8 as. per beegah. The English plough has been fairly tried in this country, to the ex-

tent of 200 beegahs for three years, and with a mind desirous of effecting some improvement, but it was at length relinquished by the party who made the experiment, as inapplicable to this soil and climate. In one way only may it be of use; to break up waste land, and the elephant is decidedly the fittest animal to draw it. Several trials have been made; that on the most extensive scale by Mr. David Scott, many years ago at Goruckpore.

The implement which serves to cover in the seed, and which supplies the place of harrow and roller, is called a hingah. It is a straight piece of wood 10 feet long, 8 inches broad, and 4 inches deep. The wood on the lower flat side is hollowed out. To this implement a chain is attached at each end, the hollow side is placed on the ground, and two pair of oxen are yoked to it. Two ploughmen stand on the flat upperside, and as it moves forward, it covers in the seed, smooths the ground, and breaks the clods.

The next implement in point of usefulness is the hoe. It is heavier and is used in a much more efficient manner than in England, where the operation is a mere scrape, leaving the roots of the weeds to grow again. Here they cut the earth to the depth of 4 inches, taking out the weeds by the roots. This instrument is used between the growing plants of cotton and sugar-cane, and is employed, particularly in North Behar, to cut out perennial weeds in April and May, and during the operation of the fallow. From five to twenty men hoe a beegah in one day, according to the state of previous preparation of the field.

The koorpee or short weeding spade, is an instrument in the use of which the natives of this country excel all others; men, women, boys, and girls, use it with great dexterity. With this little instrument, only about a foot long, with an iron edge about two inches broad, the whole surface of the field is broken, and every particle of weed taken out and conveyed to the side of the field. Those who have witnessed the slovenly manner in which this operation is performed in England, will acknowledge the superiority of the natives in weeding. From ten to twenty persons clean a beegah in one day.

Throughout South Behar, a very simple drill is used. It is in shape like a plough, having a bamboo tube fitted into a hole, which passes through the body of the plough, the upper end of which, has a small hopper fitted to it. The ploughman places his hand, full of seed, on this hopper, and as he gives it out slowly, it is conveyed through the hollow bamboo to the

furrow below, which is 4½ inches deep. About half an inch of earth crumbles into the furrow behind the plough and covers the seed, which is thus placed deep, and in moist ground. Were they now to harrow the land, the seeds would not vegetate from such a depth. The indigo planters in Tirhoot, have invented a drill which answers their purpose admirably. When the season is advanced, and the first sowing has failed, or is suspected to fail, this implement often saves a crop by the dispatch with which it enables them to resow, without stirring the ground, and without injuring the remains of the former plant, which may still survive. This instrument costs Sixteen Rupees.

The fallow is prepared as follows:—In the months of April or May they receive two ploughings. The perennial weeds, thistles, and thorns, are dug out with the hoe, and are destroyed by exposure to the sun. When the rains set in, the ploughing and cross ploughing is continued every fortnight, and by this means, the seeds of annual weeds spring up and are destroyed by the frequent action of the plough, which for this work is particularly efficacious. All the cattle belonging to the owner of the field are kept upon it during the operation of the fallow, or for four months, and this is all the manure bestowed upon the field. That of the other eight months, is wasted or burnt. When the sowing season arrives, in the beginning of October, the field is clean, and in perfect tilth.

A selection here is all that is necessary of the cultivation of particular plants. The agriculture of the coery caste is most worthy of notice. Perhaps there is no example to be found where agriculture approaches so nearly to gardening. A portion of the finest land called dhee, that nearest and surrounding the village, which is elevated above the surrounding country by the wreck of mud houses, ashes, fragments of pottery, and decayed vegetable and animal matter is chosen for this purpose. The rent is from four to ten Rupees, and near Patna as high as fifteen Rupees per beegah. These, after the fallow or first crop during the rains, are prepared and laid out into small hollow beds from six to nine feet square. In these, grain crops are sown and watered, but more particularly the poppy. The water is supplied from wells, built of solid masonry, and sometimes when the ground is solid, merely dug without brickwork. These wells are seldom less than five and twenty feet deep. The water is raised in a leather bucket by the labour of two bullocks. It requires one man to drive them, one to fill and empty the bucket, and one to conduct the

water over the field. After the first watering, they are able in this manner to irrigate half a beegah a day. The produce is greatly increased by this operation, and the Natives have a notion, that there is something fertilizing in the water of particular wells.

After the poppy, the sugar-cane lands are cultivated with the greatest care. There seems to be no error as far as the preparation of the land, and the subsequent hoeing are considered. They however continue to use the same degenerate cane, which they cannot help until supplied with better. When the canes spring up they are carefully hoed and watered, during the drought of March, April, and May. Three months dry weather immediately after planting, is certainly unfavourable. Irrigation can only supply the roots, but not the leaves with moisture. Notwithstanding this disadvantage, it is well known that sugar-cane may be produced in this country an inch and a half in diameter, and eight or ten feet high, without the head. The great error in the manufacture of sugar lies in their not clarifying and draining it by the first process, instead of which the juice of the cane is concentrated with all its impurities, and made over to the hulwaye or confectioner, who commences his process of refining after the heterogeneous mass has become too cold to drain well and an incipient fermentation has commenced in the mixture of impurities, molasses and crystallized sugar. A second boiling becomes necessary, which has always been found unfavourable to the crystallization of this substance.

There are three kinds of cotton cultivated in South Behar, Rehdhea, Hewlee and Jeitowa. The Rehdhea is the finest and is sown about the autumnal equinox, along with oil seeds. These ripen in January, when the stalks are pulled up by the roots, and the ground is then thoroughly hoed and watered. This operation is continued throughout the months of February, March, April, and May, when it ripens and produces 10 maunds of uncleaned cotton, but new lands have been known to produce 20 maunds, the proportion of seed to cotton being as $2\frac{1}{2}$ of the former to 1 of the latter. It is said that the fine Dacca muslin was formerly made from this cotton, but now there is none exported from the district where it grows. The present bazar price of uncleaned cotton is five pice a seer of 48 sicca weight.

Hewlee cotton is sown along with Indian corn in June. The corn is cut in September, when the lands are well hoed, and watered only two or three times until May, when the pods

are gathered. The produce and quality of this cotton is nearly equal to that of the Rehdhea. The quantity of seed to cotton is as 3 to 1.

Jeitowa is also sown at the beginning of the rains, along with Indian corn. It does not receive any cultivation while growing, nor watering, and the produce is three or four maunds. The proportion of seed to cleaned cotton is as 5 to 1. The present bazar price is 22 seers per Rupee. The maund mentioned above is equal to 54 lbs. This last is the cotton so well known in commerce. None of these kinds of cotton are exported from Behar. There is also another kind of cotton cultivated in the north of Tirhoot, called kokety, of a yellow colour, and preferred for making fine thread. The natural humidity of Tirhoot, renders irrigation unnecessary, but the plant appears very impoverished, and the produce is very low.

The following is a specimen of the produce of five beegahs of irrigated land in the village of Kuttea, Pergunnah Beeyah, Shahabad, cultivated by Dheena Koeree. The four crops are the produce of one year, the rent 6 Rupees per beegah.

1st crop Indian corn,	100 mds. sold for ..	Rs.	88	0	0
2d Opium,	33 seers, ditto		115	0	0
Poppy seed,	25 mds. ditto		25	0	0
3d Cheena (lunery seed)	90 mds. ditto		90	0	0
Rupees 63-9 annas per beegah, ...		Rs.	318	0	0

The produce of opium in the above example is low. It sometimes amounts to 15 seers per beegah. Among the green crops of this country may be reckoned, the succurkund or sweet potatoe, the sootanee and carrot, but these are cultivated for the food of man and not of beast. Of these the succurkund is decidedly the best, and perhaps is inferior to none of the root kind in nutritive qualities. It requires to be cultivated with particular skill, and the experienced ryut pitches upon a particular soil where it is known to thrive. It is a creaper, and is propagated from a portion of the stem planted out in August, on light land, but not recently manured. It yields 150 mds. to the beegah, with little trouble. If it is attempted to obtain a richer crop by the aid of manure, it runs to littee (stem) in the greatest luxuriance, but the root from being a foot in length and an inch and a half in diameter dwindles away to the thickness of a quill.

The sootanee is planted in July in the richest land; 20 maunds of the root are planted on one beegah, the produce is 300 maunds. This is not nearly so palatable as the succur-

kund, but a ploughman is said to consume 5 seers of it. Both these crops are planted and dug up with hoe. They open in the end of December.

The carrot as it requires irrigation can never become an article of general cultivation. It is sown in the beginning of October, and sometimes yields a very abundant crop equal to 400 maunds. The crop is usually sold to coonjuras, those who sell vegetables at 1 Rupee 4 annas per cottah.

The rotation of crops on high land takes place as follows :—

1st year, fallow and wheat.

2d year, muckai (Indian corn) for a first crop sown in June and reaped in September. The second crop, barley of that kind called " big" in England and " bear" in Scotland.

3d year, murwa, sama, coweree, (millets) sown in June with anar or cotton for a second crop, when the field is poor, they sow but one crop of the small janeira in the beginning of August which is reaped in December and then lies fallow again.

The two springs of this country, are distinguished by a remission rather than an increase of heat. The first in June, when the rains set in, and occasions a fall of the thermometer of from 96° to 86°. The second in October, when the shortened day and decreased altitude of the sun just begin to effect a change in the temperature.

The natives seem to understand the use of a judicious rotation of crops. Those plants which grow during the rains, and which are furnished with a larger system of leaves to collect food from the atmosphere, are reckoned less prejudicial to the soil than wheat or barley. The alluvial lands or the dearas of the Ganges, bear these grains yearly, with sometimes a change of a pulse crop. The paddy lands also bear year after year the same crop without manure, and without any sensible diminution of the produce. This may be accounted for in the first instance by the land being renovated by a deposition from the river, and in the second instance by the crop deriving its principal support from the water in which it grows. This is kept in small borders less than a foot high. But sometimes rice grows and ripens in deep water and it is reaped by means of boats.

The produce of grain crops in this country is in every gradation, from a total failure to what on the present system may be considered a maximum, viz. wheat, per beegah, 20 maunds; barley, 30 maunds; muckai, 20 maunds; the different kinds of millet, 16 maunds; arrar, (the pigeon pea of the West Indies;) 8 maunds; cotton, with the seed, 20 maunds.

The quantity of seed of every kind sown in this country, is much less than in England, and as it is sown at a more propitious season, less also is required. A maund or 1⅓ bushel of wheat is sown, and 30 seers or 1¼ bushel of barley is the portion allowed. The size of the beegah over the greatest part of North Behar is 4,400 square yards, increasing towards the northern frontier to 6000 yards. In South Behar the beegah generally contains 3200 yards or exactly two-thirds of anEnglish acre.

The great error in Indian agriculture is the little care they take to enrich their land with manure. Their making use of the dung of animals as fuel, is the bane of their system. They have no idea of using straw as a component part of dung, and great part of this also is burnt and wasted. The remainder is used as the food of cattle, but no part is ever applied as litter. In the next place, there are no crops sown particularly for the support of cattle. No kind of grass has yet been selected for this purpose, although it is evident that such grasses exist naturally mixed with others of a coarser kind. The trials of Europeans have been directed to the cultivation of exotic grasses. These have been imperfect, not persevered in, and the result not promulgated. Even the far famed Guinea grass found so useful in the West Indies, has been abandoned and is now almost lost in this country, where it was a favourite for a short while. The Natives occasionally use sugar-cane as fodder and the stalks of the great and small Indian corn, the green holm of kissaaree, or Indian vetch; but this is done rather accidentally, for no crop is ever sown expressly for the food of cattle. All their pasture is from lands not worth cultivating. It is evident that if better food were provided, fewer cattle would answer, and straw would be spared for litter.

The principal errors of the Indian system being pointed out, the improvement naturally follows. To sow green crops for the food of cattle, to be either fed off from the ground, or to soil cattle in the house, and to litter the cattle with straw for the formation of manure. To try the value of all the different grasses that can be collected in the country, and to procure such as may be considered useful from climates approximating to that of this country. We have here only the bearded wheat, and we want altogether the seeds of the real barley, with two rows of grain on the ear. It may be more a difficult task to introduce into this country, the luxury of animal food; but there are millions of the inhabitants who only want the means to do so.

LXXI.

REMARKS ON THE APPLICABILITY OF ELEPHANTS, AS A MOVING POWER, FOR SUGAR MILLS, &c.

Extract of a letter from Captain F. Jenkins, dated 15th June, 1833.

To C. K. Robison, Esq.

I dont know whether I wrote you from Assam about the application of elephants to draught as I intended. The two guns (6 pounders) of the Assam Light Infantry have been drawn, each by a single elephant, for 4 or 5 years with the most perfect success. I saw these guns frequently at exercise, and one field day I saw them worked against other guns each drawn by a team of six oxen; the oxen had no chance with the elephants. The elephants moved much more rapidly and apparently without any distress through a long series of evolutions. Could the power of the elephants be turned to agricultural purposes? I think it might, in all such countries as border upon reed jungle especially, and most profitably in sugar mafacture. The power of an elephant is estimated at that of six horses, and from what I saw at Jorhat, I should not conceive that the power was overrated. Elephants might I think be applied to sugar mills with great economy, for the mills might then be *loco-motive*, which would suit better with the scattered condition of our cane cultivation in this country than fixed engines, and the elephants might be applied to other uses when the cane was not cutting, to pumps for any purposes, for irrigating the cane fields, indigo vats, &c., and to bring in the cane, a laborious operation where there are no roads. Coal from want of roads and rivers in many parts of the country will be long very expensive, and besides this objection to steam for small machines, the engines must be fixtures and are scarcely convertible to any other use than pressing the canes. As a matter of economy I should imagine, that in many parts of the country there could be no comparison, and besides the first outlay in engines to be saved, the manufacturer would be relieved from the occasional chance of losing a working season by accidents to the machinery, which our artisans about the country would find irreparable. Using elephants as a mov-

ing power, one would only need rollers and such machinery as every planter could direct his workmen to execute.

In all the northern and eastern districts of Bengal, the maintenance of an elephant would be under 15 Rupees a month, and the first cost of a good elephant should not be 500 Rupees; in those parts the oxen are scarcely fit for any thing but scratching through the mud of a rice field. Up-country bullocks are very dear, and their lives precarious, for the climate suits them no better than Hindoosthanee men. The cost of setting up machinery, houses, and the difficulties attendant upon us from want of able workmen, and the necessity of importing from England all our steam engines may deter, I think, many a planter from the manufacture of sugar, who would attempt it, if the tractability and great strength of an elephant in draught was properly appreciated. Of course the power of elephants might be equally well applied to any other mills not requiring more than two or three animals, for more could not be readily used, I think; but mills of from 6 to 18 horse power would suffice for many purposes, corn mills, oil presses, cotton screws, &c. The elephants applied to the Jorhat guns, I was told, went equally well the first day as now, and they remain just as efficient suwarree and carriage cattle as they were before they were put to harness, and I cannot but think that the perfect success of that experiment (Mr. Scott's I believe) justifies further trials as to their fitness as a moving power of machines.

LXXII.

ON THE CULTURE OF PADDY IN TWENTY DIFFERENT DISTRICTS.

By Baboo Radhakant Deb.

[*Read* 31*st July*, 1833.]

To C. K. Robison, Esq.

Secretary to the Agricultural Society.

My Dear Sir,—With reference to your letter of the 29th April last, enclosing copy of a note from Mr. Calder, on the cultivation of paddy in Saugor island, and requesting me to furnish a report upon the cultivation of rice throughout this

presidency; I have the pleasure to send you a particular account of the culture of dhanya or dhan, (oriza sativa) in the districts of 24-Pergunnahs (No. 1.) and Dacca (No. 2.); and also a table of the several descriptions of paddy produced in 20 districts formerly under the Khalsah (No. 3.) shewing the proper months in which each variety is sown and reaped.

The rice has four distinct names in four distinct states. While growing in the field, it is called sasya, or grain; corn in the husk, is termed dhanya or paddy; without husk, it is styled amanna, or raw rice; and when dressed, is denominated anna, or cooked rice. The varieties of rice cultivated throughout India are innumerable; but the principal sorts of them are the following seven, viz.

1. Amun dhan, a kind of paddy growing in the cold season, is so called in Bengalee, aghunee in Hindee, and haimuntik in Sungskrit. It is sown in the month of Vaisakha, (April and May;) is transplanted in Asarh, (June, July;) the lands harrowed in Sravan, (July, August;) the plants blossom in Kartick, (October and November;) they commence ripening in Agrahun (November and December,) and are fully ripe in Pous, (December, January).

2. Aoos dhan, a sort of paddy which ripens in the rainy season, is so named in Bengalee; bhudoi, in Hindee; and asoo, in Sungskrit. It is sown in Vaisakha, (April, May;) flowers in Sravun, (July, August;) and ripens in Bhadra (August, September).

3. Doatia dhan, a species of amun paddy cultivated immediately after reaping the aoos paddy in the same field. It is planted in Bhadra, (August, September;) flowers in Kartik, (October, November;) and ripens in Pous, (December, January.)

4. Julee dhan, a kind of paddy growing in lakes, is sown in Phalgoon, (February, March;) flowers in Jaistee, (May, June;) and ripens in Asarh, (June, July). In some districts, it is sown in Choit, and reaped in Sravun.

5. Boro dhan, a variety of paddy usually reaped in March or April. It is called in Sungskrit "voruva," and is sown in Agrahun, (November, December;) flowers in Phalgoon, (February, March); and ripens in Choitra, (March, April). In some places, it is sown in Choit, and cut in Asarh.

6. Oorhy dhan, or wild paddy, which is termed in Sungskrit "nivara," and grows in swamps or marshes in Bhadra, (August, September,) without cultivation, and ripens in Agrahun, (November, December).

7. De dhan, a species of grain cultivated in many parts of India, (Andrapogon saccharatus.) It is sown in Vaisakha, (April, May;) flowers in Sravun, (July, August;) and ripens in Bhadra, (August, September.)

According to Sungskrit authorities, the classes of dhanya, or grain in general, are enumerated as five, viz. 1st. Shalee dhanya, a species of paddy of two kinds; one like white rice growing in deep water, and ripening in the cold season, and the other a red sort (which is the best,) requiring only a moist soil. The principal kinds are five. 2d. Vrihee dhanya, the paddy of the most common kinds or mixed grains, ripening in the rainy season; eight principal sorts are enumerated, of which the black sort is preferable. Shushtica, or shati dhan, a kind of paddy growing rapidly, or in sixty days, and ripening in the ear before it shoots from the pod or culm, is included in this class. 3d. Shook dhanya, awned or bearded grain, as barley, &c. 4th. Shimbee, or shumee dhanya, the grain of which grows in legumes or pods, as Phasialus mungo, &c. 5th. Khoo-dra, or trina dhanya, the small grains, as panick seed, (Panicum Italicum,) &c. The names and properties of these are separately described in a Sungskrit work.

There are eight kinds of lands required for husbandry, viz. 1st. shalee bhoomee, the low land fit for cultivation of rice, particularly amun paddy; 2d. soona bhoomee, the high lands suitable for cultivation of aoos paddy, and other grain, hemp, tobacco, &c.; 3d. dooe bhoomee, the best sort of high ground fit for growing two crops, such as rice, kidney-beans, &c.; 4th. curpa bhoomee, the high ground suitable for the cultivation of cotton; 5th. inshoo bhoomee, the high ground fit for the growth of sugar-cane; 6th. vastoo, the elevated habitation of the shepherd, or agriculturist, &c.; 7th. oodvastoo, the high ground adjoining the vastoo; and 8th. baugaut, or the garden ground. Some add to it, the uplands for bamboo and plantain, and make ten kinds of agricultural ground, and assess each sort at different rates.

These observations on the cultivation of paddy and description of soil are to be considered general. The particular modes of culture are explained in the accompaying papers as enumerated above.

I remain, My Dear Sir,
Your most obedient servant,
Radhakant Deb.

Calcutta, 1st July, 1833.

No. I.

In the district of 24-Pergunnahs, two kinds of paddy are chiefly cultivated, viz. aoosh, (autumnal rice) and amun, (winter rice.) The mode of culture of the first mentioned paddy is this. In the month of Vaisakha, (April, May,) when it rains, the ploughmen till a piece of high ground first, which is called in their dialect "khil bhanga," and a few days after, they till it again; this is termed "dochasee;" they then sow the seeds in the above month, or Jyist, (May, June) and plough and harrow the ground a third time. When the plants grow up, they harrow the land once more, and root up the weeds. The paddy is ready for mowing in Bhadra, (August, September;) ten or twelve ploughs are generally required for cultivating one beegah of ground, and one Rupee per beegah more or less is expended for the purpose.

The last mentioned paddy, or amun rice is cultivated in two ways, by planting and sowing. The method of planting is this; in the month of Vaishaka, (April, May) after the fall of rain, they plough a piece of shalee bhoomee, or low land, and prepare, or granulate the soil of the tilled ground, after rain in Jyst, (May, June), and then scatter the seeds thereon; when seedlings shoot forth, it is called "cauckree tula." In the month of Asarh, (June, July) or Sravun, (July, August,) they plough and harrow the rice field and make a clayish surface; then transplant those seedlings therein, in ranges of about one span a part. If cauckree tula, or the ground for sowing is not already prepared on account of the backwardness of the season, they wet or soak the paddy in water for one day, to germinate, and plant the sprout seeds on the same clay field, in the month of Asarh, (June, July), or Sravun, (July, August.) It is denominated by the husbandmen of this district, "peke tula." The paddy is ripe and reaped in Agrahun, (November, December), or Pous, (December, January.) To cultivate one beegah of ground, thrice ploughing, twice harrowing, and once weeding (if necessary) eight ploughs, four or five coolies for planting, and 10 seers of seeds are required, and one Rupee more or less, is expended. The form and expence of culture of amun paddy by sowing, are nearly the same as those of the aoosh paddy herein before specified.

Varieties of ashoo paddy in zilla 24-Pergunnahs.

Kele aoosh, কেলেআউশ	 1	Purangee, পরাঙ্গী	 1
Gota aoosh, গোটাআউশ	 1	Arjoon shalee, অর্জুনশালি	... 1

Aoosh phoorphoore, আউশ ফুর ফুরি	1	Ayaluta, আয়ালতা	1
Soorjamunee, সূর্য্যমণি	1	Toolsee jhoore, তুলসীঝুরি	1
Aoosh nealee, আউশনেয়ালি	1	Pyarmoony, প্যারমুনি	1
Aoosh cutkee, আউশকটকী	1	Julee, জলি	1
Aoosh doobraj, আউশদুবরাজ	1	Doorga bhog, দুর্গাভোগ	1
Pipra shalee, পিপড়াশালি	1	Aoosh gungajul, আউশ গঙ্গা জল	1

These are produced upon high land, in Pergunnah Paighatee, in the zillah of the 24-Pergunnahs. They are sown in Vaisakha or Jyst, and reaped in Bhadra.

Species of amun paddy growing in the district of 24-Pergunnahs.

Calindee, কালিন্দী	1	Talmoogoor, কালমুগুর	1
Dhulee, ধলী	1	Lona bokra, লোণাবোকড়া	1
Coorchee, কুরচী	1	Bheralee, ভেড়ালি	1
Nagra, নাগরা	1	Khuer shalee, খয়েরশালি	1
Cubela bhog, কবিলাভোগ	1	Gopaul bhog, গোপালভোগ	1
Soonder shalee, সুন্দরশালি	1	Patsah ditto, পাতশাভোগ	1
Cureem ditto, করিমশালি	1	Orkuchoo, ওড়কচু	1
Ram ditto, রামশালি	1	Sunko china, শঙ্কচীনা	1
Murich ditto, মরিচশালি	1	Khejoor churee, খেজুরছড়ি	1
Kele suroo, কেলেসরু	1	Neoolee, নেউলি	1
Buga ditto, বগাসরু	1	Roopshalee, রূপশালি	1
Coomed ditto, কুমেদসরু	1	Nushee poore, নশীপুরে	1
Mudhoomaluttee, মধুমালতী	1	Banktoolsee, বাঁকতুলসী	1
Bansmuttee, বাঁশমতি	1	Somra, সোমরা	1
Hurin khoora, হরিণখুরা	1	Doode somra, দুদেসোমরা	1
Luta mow, লতামৌ	1	Purbut balee, পর্ব্বতবালি	1
Cantarangee, কাঁটারাঙ্গী	1	Cuya, কয়া	1
Dukhina narangee, দক্ষিণারাঙ্গী	1	Benaphool, বেনাফুল	1
Rajbhog, রাজভোগ	1	Bansgujal, বাঁশগজাল	1
Cunukchoor, কনকচুর	1	Caminee bhog, কামিনীভোগ	1
Chamur monee, চামরমণি	1	Moosha canee, মুষাকাণি	1
Lukhmi vilasa, লক্ষ্মীবিলাস	1	Luckhi parijat, লক্ষ্মীপারিজাত	1
Peshwaree, পেশওয়ারী	1	Gothoobee, গোথুবি	1
Bulee daur, বলিদাড়	1	Ginnee salee, গিন্নিশালি	1

Gundho custoora, গন্ধকস্তুরা	1	Patnai looria, পাটনাইলুড়্যা	1
Purumanno shalee, পরমান্নশালি	1	Chillut, ছিলট	1
Kele cotul, কেলেকোতল	1	Banscata, বাঁশকাটা	1
Hoorria, হুড়্যা	1	Aooi, আউই	1
Dulput rangee, দলপত্তরাঙ্গী	1	Bhoosee, ভুসি	1
Murya rangee, মড়্যারাঙ্গী	1	Laoopala, লাউপালা	1
Kenkee, কেনকী	1	Hoomsee, হুমসী	1
Mowluta, মৌলতা	1	Genrebucra, গেঁড়িবকড়া	1
Orra shalee, ওড়াশালি	1	Ghee cula ঘিকলা	1
Ghota bena, ঘোটাবেনা	1	Camini কামিনী	1

These are middling and fine sorts of amun paddy. It is sown in Jyst, and reaped in Assin.

Jhoonjee ঝুঁজি	1	Cartica rangee, কার্ত্তিকারাঙ্গী	1
Calaherya, কালাহেড়্যা	1	Dhulasuroo, ধলাসরু	1
Mechooa, মেছুয়া	1	Cumul bhog, কমলভোগ	1
Dhoolya, ধুল্যা	1	Chutra bhog, ছত্রভোগ	1
Assin sita, আশ্বিনশীতা	1	Ascoonee, আসকুনি	1
Surchapa, শরচাপা	1	Begoon bichee, বেগুনবিচি	1
Loochee, লুচি	1		

These are the fine sorts of amun paddy produced on high ground. They are planted in Assar and ripen in Kartick.

Bancooi, বাঁকুই	1	Menkee, মেনকী	1
Hengly, হেঙ্গলী	1	Poody, পুদি	1
Magoor shalee, মাগুরশালি	1	Panitar, পানিতার	1
Sanha, সাঁহা	1	Vaneswar, বাণেশ্বর	1
Beto, বেতো	1	Pani calasa, পানি কলস	1
Calamna, কাল আমনা	1	Bankchoor, বাঁকচুর	1
Dhulbari amna, ধলবারি আমনা	1	Soonder mookhee, সুন্দর মুখী	1
Mariche amna, মরিচে আমনা	1	Bhojrauj, ভোজরাজ	1
Meghee, মেঘি	1	Mushlota, মশলোটা	1
Coomra gurree, কুমড়া গড়ি	1	Julacaminy, জলাকামিনী	1
Matee chalee, মাটি চালি	1	Dhulamna, ধলআমনা	1

These are the coarse sorts of amun paddy produced in Pergunnah Pyeghatee, in the zillah of the 24-Pergunnahs, on a low field. They are sown after the water is dried up in Maugh,

Phalgoon, Choitra, or Vaisakha, and ripen in Agrahun or Pous.

No. II.

In the district of Dacca, boro paddy is cultivated in the following manner. A piece of ground containing 6 nul in length, and 5 nul in breadth, makes one pakee; each nul consisting of 12 or 14 cubits. The cultivators plough and harrow a pakee of the seed plot twice, in the month of Kartick, and sow half a maund of paddy therein, and then transplant the seedlings in the month of Pous, in a pakee of ground, already prepared by tilling twice with two ploughs, and harrowing twice, and afterwards weeding it once. The paddy becomes ripe, and is reaped in the month of Bysack. About 8 maunds of boro paddy more or less, are obtained from one pakee of the first sort of old ground, and 6 and 5 maunds from the second and third sorts of new ground.

The expence incurred, and profit gained, in cultivating the above-mentioned one pakee of ground are as follows:—

					Rs.	*A.*	*G.*	*C.*
Price of the 8 maunds of boro paddy produced from 1 pakee of the first sort of old ground at 2 maunds and 10 seers per Rupee is, ...					3	8	0	0
Deduct rent for the above ground,	0	12	0	0				
„ for 8 ploughs and harrows,	0	12	16	0				
„ for purchasing ½ maund of seed, ...	0	4	0	0				
„ for weeding, ...	0	5	0	0				
„ for reaping, ...	0	4	0	0				
					2	5	16	0
Net profit, ... Sa. Rs.					1	2	4	0
Price of the 6 maunds of paddy produced from 1 pakee of the second sort of new ground, at 2 maunds and 10 seers per Rupee is, ...					2	10	13	1
Deduct rent for the above ground,	0	8	0	0				
„ for 8 ploughs and harrows,	0	12	16	0				
„ for seed, ...	0	4	0	0				
„ for weeding, ...	0	5	0	0				
„ for reaping, ...	0	4	0	0				
					2	1	16	0
Net profit, ... Sa. Rs.					0	8	17	1

					Rs.	*A.*	*G.*	*C.*
Price of the 5 maunds of paddy produced from 1 pakee of the third sort of new ground, at 2 maunds and 10 seers per Rupee, is					2	3	10	0
Deduct rent for the above ground,	0	4	0	0				
,, for 8 ploughs and harrows,	0	12	16	0				
,, for seed, ...	0	4	0	0				
,, for weeding, ...	0	5	0	0				
,, for reaping, ...	0	4	0	0				
					1	13	16	0
Net profit, ... Sa. Rs.					0	5	14	0

The species of boro paddy in zillah Dacca is as follows :—

Jeera salee, জীরাশালি	1	Jaglee, জাগলি	1
Tapee salee, টাপিশালি	1	Boyalee, বোয়ালি	1
Lawa salee, লাওয়াশালি	1	Itamoogur, ইটামুগর	1
Mookta hur, মুক্তাহর	1	Moosakanee, মুষাকাণি	1

To cultivate amun paddy in the above district, one pakee of old ground is ploughed thrice with two ploughs, and harrowed six times, and then half a maund of amun paddy is sown in the month of Phalgoon, or Choitra, and again ploughed and harrowed twice. Three days after that, it is reharrowed, which is called "bata moi." The paddy is ripe for gathering in the month of Kartick or Agrahun, and about 6 maunds of paddy are produced from it. In cultivating one pakee of new ground, four times ploughing with two ploughs, and eight times harrowing are required, and for the other process, the quantity of seed, time of sowing and reaping, are the same as above. The production of the soil is about 7 maunds.

					Rs.	*A.*	*G.*	*C.*
The price of the above-mentioned 6 maunds of amun paddy produced from 1 pakee of the first sort of old ground, at 2 mds. and 10 seers per Rupee is, ...					2	10	13	1
Deduct ground rent, ...	0	6	10	0				
,, 7 ploughs, ...	0	11	4	0				
,, ½ maund of seed, ...	0	5	0	0				
,, expence of reaping, ...	0	4	0	0				
					1	10	14	0
Net profit, ... Sa. Rs.					0	15	19	1

					Rs.	*A.*	*G.*	*C.*
The price of the above-mentioned 7 maunds of paddy produced from 1 pakee of the second sort of new ground at 2¼ mds. per Rupee is,					3	3	10	0
Deduct ground rent, ...	0	4	10	0				
,, 8 ploughs, ...	0	12	16	0				
,, ½ maund of seeds, ...	0	5	0	0				
,, reaping expense, ...	0	4	0	0				
					1	10	6	0
Net profit, ... Sa. Rs.					1	9	4	0

The variety of amun paddy produced in zillah Dacca. On the North of the above zillah.

Doolai, দুলাই	1	Pakree, পাকড়ি	1
Maitachung, মাইটাচঙ্গ	1	Sirul, শিরল	1
Rajmundul, রাজমণ্ডল	1	Phootkee, ফুটকি	1
Sonadigha, সোনাদিঘা	1	Doiluj, দইলজ	1
Casiadigha, কাশিয়াদিঘা	1	Guria, গড়িয়া	1
Aswiny, আশ্বিনী	1	Naka, নাকা	1
Bugadigha, বগাদিঘা	1	Raymookhee, রায়মুখী	1
Kajla, কাজলা	1		

The aoos paddy is also cultivated in the Dacca district; they till one pakee of old ground with two ploughs three times, and break it with the harrow six times, and then sow 25 seers of seeds, or asoo paddy in the month of Maugh, or Phalgoon. Again they plough and harrow the ground twice; three days after that it is reharrowed, which is termed "bata moi," and root up the weeds once, reap the corn in the month of Jystee, and obtain 5 maunds of paddy. In the cultivation of one pakee of new ground, four times tilling with two ploughs, eight times harrowing, and ½ a maund of paddy are required. The other process is the same as above, and 6 maunds of paddy are produced from it.

					Rs.	*A.*	*G.*	*C.*
The first mentioned 5 maunds of paddy sell at the rate of 2¼ maunds per rupee is, ...					2	3	10	0
Deduct rent for one pakee of the first sort of old ground, ..	0	6	10	0				
,, Expense of 8 ploughs, ...	0	12	16	0				
,, Price of ½ maund of seed,..	0	4	0	0				
,, Charges of weeding, ...	0	4	0	0				
,, Ditto reaping, ...	0	4	0	0				
					1	15	16	0
Net profit, ... Sa. Rs.					0	4	4	0

The last mentioned 6 maunds of paddy sell at the rate of 2¼ maunds per Rupee is, ...					2	10	13	1
Deduct rent for one pakee of the first sort of new ground,..	0	4	10	0				
,, Expense of ten ploughs, ..	1	0	0	0				
,, Price of ½ maund of seed,	0	4	0	0				
,, Charges of weeding, ...	0	4	0	0				
,, Ditto reaping, ...	0	4	0	0				
					2	0	10	0
Net profit, ... Sa. Rs.					0	10	3	1

The following species of asoo paddy are cultivated in zillah Dacca :—

Calamanick, কালামাণিক	1	Pukhirauj, পক্ষিরাজ.....	1
Chitkee saita, ছিটকি সাইটা ...	1	Purangee, পরাণগি	1
Dhula saita, ধলা সাইটা	1	Chotun chapalai, ছোটন চাপা লই	1
Khagree saita, খাগরি সাইটা ...	1	Burunchapalai, বরণচাপালই...	1
Baila bukaree বাইলাবকারি ...	1	Rungargoora, রঙ্গেরগুরা	1
China tegria, চীনাটেগরিয়া ...	1	Gubeswar, গবেশ্বর	1
Caudchauk, কাদচাক	1		

Produced on high ground :—

Cowcha, কৌচা	1	Binnee dhaun, বিন্নীধান	1
Basee rauj, বাঁশি রাজ	1	Bagoon bichee, বাগুনবীচি.....	1
Calajeera, কালাজীরা	1	Mudhoo malutee, মধুমালতী ...	1
Basmuttee, বাঁশমতী	1		

Produced on the northern parts of Dacca :—

Lena, লেনা	1	Kalamadaree, কালামাদারি.....	1
Burun, বরণ.....	1	Gural, গরাল	1
Boaila, বোয়াইলা	1	Gopaulbhoge, গোপালভোগ ...	1
Dhairia, ধাইড়িয়া	1	Mudhoo malutee, মধুমালতী ...	1

No. III.

Tabular Report of the Description and Culture of Paddy produced in twenty districts, according to a memorandum made by the Roy Royan, or Principal Officer of the Khalseh.

Denomination of Paddy.	Baisakh.	Joisto.	Asar.	Sravun.	Bhadur.	Asin.	Kartick.	Aghun.	Pous.	Maugh.	Phalgoon.	Choit.
					ZILLAH BURDWAN.							
Shalee Bhudoi, or Aoos,	sow	„	„	„	reap	„	„	„	„	„	„	„
Shalee Aghuny, or Amun,	„	„	sow	„	„	„	„	reap	„	„	„	„
					ZILLAH RAJSHAHY.							
Shalee Amun,	„	„	sow	„	„	„	„	reap	„	„	„	„
Shalee Aoos,	sow	„	„	„	reap	„	„	„	„	„	„	„
Shalee Boro,	„	„	reap	„	„	„	„	„	„	„	„	sow
Shalee Julee,	„	„	„	reap	„	„	„	„	„	„	„	sow
					ZILLAH DINAJPORE.							
Shalee Amun,	„	„	sow	„	„	„	„	reap	„	„	„	„
Shalee Aoos,	sow	„	„	„	reap	„	„	„	„	„	„	„
Shalee Julee,	„	„	„	reap	„	„	„	„	„	„	„	sow
Shalee Boro,	„	„	reap	„	„	„	„	„	„	„	„	sow
					ZILLAH KISSENNAGORE.							
Shalee Julee,	„	„	„	reap	„	„	„	„	„	„	„	sow
Shalee Bhudoi, or Aoos,	sow	„	„	„	reap	„	„	„	„	„	„	„
Shalee Aghuny, or Amun,	„	„	sow	„	„	„	„	reap	„	„	„	„
Shalee Boro,	„	„	„	reap	„	„	„	„	„	„	„	sow
					ZILLAH POORNIAH.							
Shalee Aghuny, or Amun,	„	„	sow	„	„	„	„	reap	„	„	„	„
Shalee Bhudoi, or Aoos,	sow	„	„	„	reap	„	„	„	„	„	„	„

Denomination of Paddy.	Baisakh.	Joisto.	Asar.	Sravun.	Bhadur.	Assin.	Kartick.	Aghun.	Pous.	Maugh.	Phalgoon.	Choit.
ZILLAH RUNGPORE.												
Shalee Aghuny, or Amun,	,,	,,	sow	,,	,,	,,	,,	reap	,,	,,	,,	,,
Shalee Bhudoi, or Aoos,	sow	,,	,,	,,	reap	,,	,,	,,	,,	,,	,,	,,
Shalee Boro,	,,	,,	,,	reap	,,	,,	,,	,,	,,	,,	,,	sow
Shalee Julee,	,,	,,	,,	reap	,,	,,	,,	,,	,,	,,	,,	sow
ZILLAH 24-PERGUNNAHS.												
Shalee Bhudoi, or Aoos,	sow	,,	,,	,,	reap	,,	,,	,,	,,	,,	,,	,,
Shalee Aghuny, or Amun,	,,	,,	sow	,,	,,	,,	,,	reap	,,	,,	,,	,,
Shalee Boro,	,,	,,	reap	,,	,,	,,	,,	,,	,,	,,	,,	sow
Shalee Julee,	,,	,,	,,	reap	,,	,,	,,	,,	,,	,,	,,	sow
ZILLAH BEERBHOOM.												
Shalee Bhudoi, or Aoos,	sow	,,	,,	,,	reap	,,	,,	,,	,,	,,	,,	,,
Shalee Aghuny, or Amun,	,,	,,	sow	,,	,,	,,	,,	reap	,,	,,	,,	,,
Shalee Boro,	,,	,,	reap	,,	,,	,,	,,	,,	,,	,,	,,	sow
ZILLAH MOORSHEDABAD.												
Shalee Ahguny, or Amun,	,,	,,	sow	,,	,,	,,	,,	reap	reap	,,	,,	,,
Shalee Bhudoi, or Aoos,	sow	,,	,,	,,	reap	,,	,,	,,	,,	,,	,,	,,
Shalee Boro and Julee,	,,	,,	,,	reap	,,	,,	,,	,,	,,	,,	,,	sow
ZILLAH JESSORE.												
Shalee Aghuny, or Amun,	sow	,,	,,	,,	,,	,,	,,	reap	,,	,,	,,	,,
Shalee Bhudoi, or Aoos,	,,	,,	sow	,,	,,	reap	,,	,,	,,	,,	,,	,,
Shalee Boro,	,,	,,	reap	,,	,,	,,	,,	,,	,,	,,	,,	sow
Shalee Julee,	,,	,,	,,	reap	,,	,,	,,	,,	,,	,,	,,	sow

Denomination of Paddy.	Baisakh.	Joisto.	Assar.	Srawun.	Bhadur.	Assin.	Kartick.	Aghun.	Pous.	Maugh.	Phalgoon.	Chait.
ZILLAH JALAULPORE.												
Shalee Amun,	,,	,,	sow	,,	,,	,,	,,	reap	,,	,,	,,	,,
Shalee Aoos,	sow	,,	,,	,,	reap	,,	,,	,,	,,	,,	,,	,,
Shalee Boro,	,,	,,	reap	,,	,,	,,	,,	,,	,,	,,	,,	sow
Shalee Julee	,,	,,	,,	reap	,,	,,	,,	,,	,,	,,	,,	sow
ZILLAH MYMUNSING.												
Shalee Aghuny, or Amun,	,,	,,	sow	,,	,,	,,	,,	reap	,,	,,	,,	,,
Shalee Bhudoi, or Aoos,	sow	,,	,,	,,	reap	,,	,,	,,	,,	,,	,,	,,
Shalee Boro,	,,	,,	reap	,,	,,	,,	,,	,,	,,	,,	,,	sow
Shalee Julee,		,,	,,	reap	[illegible]	,,	,,	,,	,,	,,	,,	sow
ZILLAH RAJMUHUL.												
Shalee Amun,	,,	,,	sow	,,	,,	,,	,,	reap	,,	,,	,,	,,
Shalee Aoos,	sow	,,	,,	,,	reap	,,	,,	,,	,,	,,	,,	,,
Shalee Boro,	,,	,,	reap	,,	,,	,,	,,	,,	,,	,,	,,	sow
Shalee Julee,	,,	,,	,,	reap	,,	,,	,,	,,	,,	,,	,,	sow
ZILLAH CHITTAGONG.												
Shalee Aoos,	sow	,,	,,	,,	reap	,,	,,	,,	,,	,,	,,	,,
Shalee Amun,	,,	,,	sow	,,	,,	,,	,,	reap	,,	,,	,,	,,
Shalee Julee,	,,	,,	,,	reap	,,	,,	,,	,,	,,	,,	,,	sow
Shalee Boro,	,,	,,	reap	,,	,,	,,	,,	,,	,,	,,	,,	sow
ZILLAH HIDGELEE.												
Shalee Amun,	,,	,,	sow	,,	,,	,,	,,	reap	,,	,,	,,	,,
Shalee Aoos,	sow	,,	,,	,,	reap	,,	,,	,,	,,	,,	,,	sow
Shalee Julee,	,,	,,	,,	reap	,,	,,	,,	,,	,,	,,	,,	,,
ZILLAH AZEEMABAD.												
Shalee Aoos,	,,	sow	,,	,,	,,	reap	,,	,,	,,	,,	,,	,,
Shalee Amun,	,,	,,	sow	,,	,,	,,	,,	reap	,,	,,	,,	,,

Denomination of Paddy.	Baisakh.	Joiste.	Assar.	Sravun.	Bhadur.	Assin.	Kartick.	Aghun.	Pous.	Maugh.	Phalgnoo.	Choit.
					ZILLAH MIDNAPORE.							
Shalee Amun,	„	„	sow	„	„	„	„	reap	„	„	„	„
Shalee Aoos,	sow	„	„	„	reap	„	„	„	„	„	„	„
Shalee Boro,	„	„	reap	„	„	„	„	„	„	„	„	sow
Shalee Julee,	„	„	„	reap	„	„	„	„	„	„	„	sow
					ZILLAH CALCUTTA.							
Shalee Amun,	„	„	sow	„	„	„	„	reap	„	„	„	„
Shalee Aoos,	sow	„	„	„	reap	„	„	„	„	„	„	„
Shalee Julee,	„	„	„	reap	„	„	„	„	„	„	„	sow
					ZILLAH RAMGURH.							
Shalee Sattee,	„	„	„	„	„	reap	„	„	„	„	„	sow
Shalee,	„	„	sow	„	„	„	reap	„	„	„	„	„
					ZILLAH SYLHET.							
Shalee Amun,	„	„	sow	„	„	„	„	reap	„	„	„	„
Shalee Aoos,	sow	„	„	„	reap	„	„	„	„	„	„	„
Shalee Julee,	„	„	„	reap	„	„	„	„	„	„	„	sow
Shalee Boro,	„	„	reap	„	„	„	„	„	„	„	„	sow

LXXIII.

REMARKS ON THE "RAEWASH," A SPECIES OF RHEUBARB.

By Captain Wade.

Sir,—I have the pleasure to send you a portion of some seeds lately received by me from Cabul, which I hope will be acceptable to the Society. Among them you will find the seed of the "Raewash," a species of Rheubarb, which grows wild in the mountains North of Cabul called the "Kobiston." It is an esculent herb possessing an agreeable acidity. The natives of Cabul are in the habit of masticating it in its raw state as the Indians do the sugar-cane; but it is extensively used for

culinary purposes, and is supposed to be a fine stomachic. It is also prepared either as a pickle or preserve. In the month of May it is brought to the markets of Cabul in great abundance. Some idea may be formed of its extensive consumption from the fact of fifty maunds a day being the usual supply. Though not cultivated it is carefully shaded from the rays of the sun to preserve its succulent quality. It is not found in Bokhara, and only very sparingly in Herat, nor is it indigenous to Candahar and Peshawur, but it is exported to these places and considered a rarity by those who can afford to use it. With the seed I send also some dried slips cut from the stem of the plant in its green state. When required to be used as a pickle or preserve, the bark and fibrous parts are extracted from the stem, the size of which, when the plant is at its full maturity, is nearly equal to that of a man's arm both in length and thickness.

I have the honour to be, SIR,
Your obedient humble servant,
(Signed) C. M. WADE.

Loodianah, 15*th March*, 1834.

LXXIV.

THE ADDRESS OF THE AGRICULTURAL AND HORTICULTURAL SOCIETY OF INDIA TO THE RIGHT HONOURABLE LORD WILLIAM CAVENDISH BENTINCK, G. C. B. & G. C. H. GOVERNOR GENERAL OF INDIA.

[*Proceedings* 11*th March*, 1835.]

MY LORD,—We beg leave respectfully to express to your Lordship our deep regret at your approaching departure from this country, and that the state of your Lordship's health has unfortunately rendered it necessary. In your Lordship the Agricultural Society has always found a patron who has taken an active interest in its proceedings. During the period you have presided over the Councils of India, the support and encouragement of the Government have uniformly been afforded to all our endeavours to improve the Agricultural productions of the country. To the aid which the Society has thus receiv-

ed the experimental farm at Akra owed its existence. Our report of the result of the important experiments which have thus been tried, owing partly to the absence of our President, and to other circumstances over which we had no controul, has not yet been forwarded to Government. We feel assured however that when made, it will shew, that there exist good grounds for our opinion that nothing but the application of skill, and capital is necessary to cause the chief agricultural products of India, successfully to compete with those of America and the West Indies. We would here advert to the importation of American cotton seed which we were enabled to effect by the assistance our funds received from Government. The distribution of this seed has been general throughout India, and has, amongst the native population, excited much interest. The consequence we trust will be an increased cultivation of cotton of a superior description. When we reflect, that it was not until after the year 1790, that cotton, now its principal staple, and the source of such vast advantage to America, was introduced into that country, it is not too much to expect, that in future years its cultivation will become a source of equal benefit to India.

The advantages to be obtained from the improvement of the agricultural productions of British India, will be greatly extended when, as we confidently hope, the staples of this country shall be relieved from the restrictions which now operate to their prejudice, and which have in a great degree prevented the good effects, which it was the object of this Society to promote. We have lately forwarded to England petitions to both Houses of Parliament, praying for an equalization of the duties on East Indian produce, with those of the West Indies and the Mauritius, and pointing out the obstacles that exist to their growth and improvement. To your Lordship it is unnecessary for us to state how important it is to the agricultural prosperity of India, that these discouragements should be removed. We would respectfully solicit your Lordship's support to the objects of our petition, confident that in you the interests of India, will always find a protector and a friend. Your Lordship is well aware, that the cultivation of the sugar cane can be carried on in this country to an almost unlimited extent; an object of the highest importance to its vast and impoverished population. We would on their behalf call to your Lordship's observation, that whatever claims the West India colonies, or the Mauritius might formerly have had to monopolize the supply of the home market, the munificent grant lately be-

stowed upon them to procure the emancipation of the Negro population, ought now to be considered as a sufficient answer to any further consideration at the expence of the community at large.

Next to the unequal burden that is laid in the English market upon the sugar, and some other productions of this country, we conceive that the vexatious system of restrictions upon the Indian market, which goes by the general name of the transit duties, offers the most serious obstacle to the proper development of the agricultural resources of India. We have observed with sincere satisfaction, the preliminary measures which have been adopted by your Lordship for the removal of this grievance. Should these measures result, as we trust they will, in the abolition of the internal Custom Houses, the people of India will owe to your Lordship the boon of freedom of the home market, and will be relieved from the ruinous extortions and delays to which they are at present daily subjected on almost all the great routes of trade, and which, while they diminish to the producers the demand for his produce, cause to the consumers, that is to the whole of the people of India, a general increase in the price of commodities.

We view with pleasure the measures adopted by your Lordship's Government, to improve the infernal communications of this country, as another means which will indirectly tend to benefit its agricultural interests. The communication by steam with the upper provinces has been established under your Lordship's direction; and we trust that the same enlarged views which have induced the present Government to plan and commence the great roads throughout the country, will be followed up by your successors.

There is another measure most intimately connected with the objects of this Society on which we cannot be silent. It is to your Lordship that we are indebted for the important enquiry that has been made whether the culture of the tea plant can be introduced into Hindoosthan. A committee has been formed by Government, and most active investigations have taken place with that object. In the progress of this committee a discovery has been made, which we do not hesitate to pronounce as one of a most interesting, and important nature as connected with the commercial and agricultural interests of this empire; we allude to the existence of the real, and genuine tea plant of China, indigenous within the Honourable Company's dominions in Upper Assam. This

shrub is no longer to be looked upon as a plant of doubtful introduction; it exists already planted by the hand of nature through a vast extent of territory in Upper Assam bordering on the Chinese and Burmese Provinces of Shore and Yunnan, where it is at present cultivated for its leaf both for consumption and exportation. We cannot therefore but anticipate the best results from these enquiries now as we understand in active operation.

We cannot conclude, without requesting your Lordship to accept our sincere wishes for your restoration to health, and that your life may long be spared to enable you to pursue that path of honourable usefulness in which your Lordship has been so greatly distinguished.

LXXV.

THE REPLY OF THE RIGHT HONOURABLE THE GOVERNOR GENERAL TO THE ABOVE.

[*Read 8th April*, 1835.]

Eagerly devoted, for many years previous to my return to India, to agricultural pursuits, it has been a deprivation of much amusement and interest, to have been debarred by my public duties from taking any part in the transactions of your Society. I have however had ample means of estimating the utility of your labours, and the zeal and ardour, with which they have been prosecuted. I congratulate you at the same time upon having a President, so well able by his anxious cooperation and high influence to second your endeavours to better the condition of the people, in this most important branch of rural economy.

As for all the great measures of justice and policy, to which you refer, the equalization of the duties upon those great products of the country, that would be mutually beneficial to India and to Britain, I think we may confidentally rely upon their being no longer delayed. It will however be my duty to represent to the Home Authorities the injustice, and impolicy of existing discouragements. Those in India, which have been such a dead weight upon her commercial and agricultural prosperity are in a fair train of being very much diminished, if not totally abolished, as I hope may be the result.

It is impossible not to deplore the same defective state in the agricultural, as in every other science in this country. Look where you will—examine the whole scheme of this Indian system, and you find the same results—poverty, inferiority, degradation, in every shape. For all these evils, knowledge, knowledge, knowledge, is the universal cure.

It is to be hoped, that the progress in European literature, will lead to those improvements in agriculture, which during the last half century have so much benefitted the mother country. It was my intention, had I remained in India, to have proposed the establishment of small farms in the upper, centre, and lower provinces, as seminaries, or rather examples of improved modes of cultivation and cropping, and of preparing for distribution seeds and plants of the superior products. It is part of the general education, in which a very small annual sum, well expended, might have been attended with inestimable advantages. The very limited establishment and means at your disposal have shown what might be done. We must not forget that the government is the landlord of the country, possessing both the means, and knowledge of improvement, and, putting all obligations of public duty aside, is the most interested in the advancement in wealth, and comfort of its numerous tenantry.

I cannot refrain from bringing to the notice of the Society, the superior cart and animal in general use in the Madras presidency. The large high-spoked wheel is every where seen, and the bullock is of a very much larger size. A very few Rupees would enable the Society to expose annually for sale a small number of the former. The loss could not be great, and the experiment of a few years would shew the greater weight, which the high wheel by more easily overcoming obstacles, will draw. The inferiority of the cattle in Bengal is owing in my opinion to the defect in the system of cropping, which provides no artificial food for the animals during the dry season. There is a high plant at Rio Janeiro, introduced from the coast of Africa, but the name of which I forget, that I think would be a most valuable acquisition. I brought from thence some plants with me, but the greater part perished at sea, and I have not heard what fate attended those, which were transferred to the Botanical garden in Dr. Wallick's absence.

Accept, I request, in conclusion, my very grateful acknowledgements for this very flattering mark of your consideration and regard.

LXXVI.

REPORT OF THE COMMITTEE ON THE SUBJECT OF INTRODUCING THE HIGH-WHEELED CART OF MADRAS ALLUDED TO IN THE FOREGOING PAPER.

[*Read* 10*th June*, 1835.]

The Committee appointed by the Agricultural and Horticultural Society to consider and report upon certain suggestions made by Lord William Bentinck in his reply to the Society's address, beg leave to submit the following result of their enquiries.

In order to benefit by the best assistance procurable in their investigation, the Committee addressed themselves in the first instance to Lieut Col. Beatson, Commissary General, Capt. Parsons, superintendent of the Hurriana establishment, and Lieut. Col. Skinner, at Hansi; from all of whom they have met with the most courteous and prompt compliance with their wishes. The correspondence which has taken place on this occasion and which has in a great measure superseded the present report, was laid before the Society at their last meeting, with the exception of the reply from Lieut. Col. Skinner, subsequently received, and which accompanies this statement.

It will be seen from the above documents, that a series of experiments was instituted four years ago at Hissar on a scale of considerable extent and under the most judicious management, with the view of introducing the large Mysore cattle and crossing it with that of our own provinces. The result was unsatisfactory as far as regards the prospect of an immediate or direct establishment of the Mysore breed in Western Hindoosthan; although it may perhaps not be unreasonable to expect, that a useful intermixture will be produced, at the 3d or 4th remove, by crossing it with our own cattle. In this manner the objects in view in those costly attempts may perhaps in time be partially accomplished.

With respect to the small breed of Bengal, the Committee think themselves warranted in speaking with an equal degree of confidence, not only in regard to the difficulty, if not impossibility, of introducing a larger species from our own Northern and Western provinces, or from Mysore, but also as far as respects the doubtful result which would be produced, even if an

attempt of this nature were to prove successful in the first instance. Every one must have witnessed the speedy deterioration which has invariably followed the introduction into lower Bengal of any sort of large sized cattle on occasions of public emergency or for the sake of trial; and if individual instances have now and then succeeded, it must be borne in mind, that private enterprize and exertions will sometimes accomplish that, which cannot be attained if attempted on a public and extensive scale. Hence it happens that we meet, occasionally with fine specimens of foreign cattle yoked before gentlemen's carts in Calcutta, while whole herds of the same breed are seen to linger and decay in public establishments. But the Committee beg to repeat, that it appears to them very doubtful whether any such attempt however successfully made, would be followed by any ultimate and permanent benefit. They are of opinion that the small Bengal breed is peculiarly well adapted for the climate, the roads and the light but continuous and unceasing agricultural labour, which designate this province. It is indeed a known fact, that this active though diminutive breed has been found of great use even beyond the limits of Bengal to the westward, on occasions of long continued and harrassing ordnance service. In expressing this opinion, however, the Committee would not be understood to affirm that the Bengal breed is unsusceptible of improvement; what they mean to say is simply, that the object is not to be accomplished by cross-breeding, but by a more judicious and compassionate treatment of this indefatigable little animal, and above all by the use of some more suitable and nutritious sorts of fodder than the paddy straw affords;—one of the salutary consequences which would follow the introduction of that admirable rotation of crops, which is in full force from the Himalaya to Cape Comorin. The Committee are of opinion that much permanent good would be effected in this respect were the Society to import and distribute gratuitously large quantities of seeds of grasses (for instance guinea grass) and other articles of fodder.

The Committee beg to observe that the experiments to which the highly interesting and instructive communications now before the Society refer, though the most recent and in one respect the most comprehensive, are by no means the only trials that have been made either on the public account or by private enterprize. In the years 1814-15 an experiment was conducted by the stud department; and not less than half a century ago a great number of experiments was made under

the superintendence of a Mr. Mallet, directed generally to the improvement of the agriculture of this country. The result of all those undertakings was unfavourable, owing chiefly, the Committee feel disposed to think, to the fallacy of all theoretical speculations in matters of this nature, and to the striking contrast which exhibits itself between the facility with which improvements may be suggested in the husbandry of any given country, and the extreme difficulty of carrying such improvements into effect, except under circumstances of great skill, judgment and perseverance, aided by sound local experience.

With reference to the other branch of their enquiries, namely, the proposed introduction of the high-wheeled cart of the Madras presidency, the Committee are of opinion that the present light cart of Bengal is suited to the size of the cattle, and that unless a larger description of bullocks is used for draught the introduction of a higher wheel would not be feasible. The extreme poverty of that class who gain a livelihood by hiring carts cannot afford the introduction of iron axles, which appears to be all that is wanted to make the present very light cart in all respects suited to the cattle and roads of lower Bengal. The Committee have nevertheless taken measures to procure patterns of the Madras cart wheel and axletree, which will be submitted to the Society as soon as they are received.

W. Dunlop.
E. J. Honywood.
J. Minchin.
J. Kyd.
N. Wallick, M. D. *Sec.*

Town Hall, 30th May, 1835.

LXXVII.

ON THE PEACH AND PLUM TREE.

By Lieut. Kirke.

[*Read 10th June*, 1835.]

The tree must be first trained on espaliers, which improves the quality of the fruit, and prevents its being blown off by the constant wind storms, (which are so common in India;) it also allows the sun to penetrate to the fruit, &c. &c. The size of the

espalier I make use of, is about 14 feet high and 16 broad, the cross timbers strong enough to bear the weight of a man.

1. In the beginning of July, raise a sloping mound of earth round the stem of the trees (No. 1.) about 2 feet high, which cover over with bricks so as to prevent the rain penetrating to the roots, at the same time prune the trees of all luxuriant shoots and useless wood, retaining the healthiest of the *young wood* over every part of the tree, for the production of fruit next year.

2. On the 1st of October (the rains being then over) lay bare the roots of the trees, for at least 7 or 8 feet all round, and 2½ feet deep, the roots must now be pruned of one-fourth, which causes the wood to ripen quicker, and the leaves to fall earlier, besides improving the health of the tree. The luxuriant water shoots must be again removed, which will throw more strength into the part kept for fruit next year and occasion its ripening earlier.

3. By the 10th of November, the wood will have become perfectly ripe, and the leaves commencing to fall, when the trees must undergo a thorough pruning, minding to keep a regular distribution of young wood over every part of the tree, (as the peach never bears well on the wood which has before borne fruit). All the shoots you keep must also be shortened to eight or ten eyes.

4. By the 10th of December, a few blossoms will appear, when the roots must be covered in with a mixture of equal parts, of good earth, gravel, or coarse sand, and old manure from the stables, when all the blossoms have expanded, and are passing into fruit, the branches of the tree, (if large), the stem, (if small), must be wrung, which will increase the size of the fruit, and accelerate its ripening, at least three weeks if not a month.

N. B. I have to mention that wringing must not be practised, except at the abovementioned period, or at least a fortnight later, as I have from experience found, that it did not injure the trees in the slightest, when the operation was performed at that period stated, but if done later it had an injurious effect. Should any one however feel inclined to practise it later, I recommend a piece of strong wire to be tied tight round the branch of the tree, it will have the desired effect of preventing the sap returning to the roots, and may be removed at any time.

5. To perform the operation of wringing, a perfect circle of outer and inner bark must be cut clean out with a knife. The

best plan I have yet tried, is getting a penknife with two blades at the same end, which when both open, stand about ¼ of an inch apart. This is passed round the stem or branch; then with the thumb nail remove the bark that has been separated, which I consider is better than cutting it with the knife, as with the latter, you are liable to cut the new wood, or alburnum underneath the bark which is particularly injurious.

6. From the time the blossoms appear, until the end of February, I recommend sirkee mats or chicks being kept over the espaliers to prevent the frost from touching the blossoms and fruit, as well to protect them from rain during the period the blossom is passing into fruit.

Blight. Should the trees be at all blighted, I recommend tobacco boiled in water, allowed to cool, and then sprinkled over the tree with a brush used in white washing; three applications will completely remove it.

7. *Thinning the fruit.* When the fruit is about the size of a small marble, take off at least a third of it: this must however not be done in one day, but partially taken off during four or five days. When the stoning is over, remove again one-third, but if thinned to a great extent, it will be all the better for it. Great care must be taken never to allow two peaches to remain at the same eye, and that the thinning is gone through with regularity.

8. *Watering.* Whilst the blossoms are setting little or no water should be given, but when out, it should be freely given to the roots early in the morning. After the first thinning is completed, I consider that great advantage is obtained by watering the fruit and leaves, which may be done with great care by having a hole dug (about the size of a bucket) near to each tree, and when the roots are watered, (every four days), making a man throw up the water to the top of the tree with his hands. When the fruit swells off from ripening, or rather when it begins to change colour, all watering must cease. I take great care that nothing is allowed to grow within four yards all round the tree, and have the weeds removed once in three weeks, when the ground is also stirred. I have now followed the above plan for two years, and have had ripe peaches from the 25th April till the 5th of July, and the largest I have yet seen in India, numbers of them weighing from 14 to 18 Rupees; and one weighed upwards of 19.

H. KIRKE.

Deyrah Doon, May 17th, 1835.

LXXVIII.

ON THE CULTIVATION OF THE ARTICHOKE.

By Trevor Plowden, Esq.

[*Read 13th May*, 1835.]

To N. Wallich, Esq.

Secretary to the Horticultural Society.

Dear Sir,—In reply to your circular, dated the 30th ultimo, and with the desire to contribute all my aid to the work on gardening, which the Horticultural Society proposes to publish, I beg to acquaint you, that for the last two years I have successfully cultivated the artichoke plant, so as to have an abundant supply of this esteemed vegetable at the proper season. I had for many years observed in private gardens the luxuriant appearance of the plant, and as they produced a few small heads I was encouraged to believe that their cultivation might be improved, and with a little pains brought to greater perfection; I applied accordingly to a friend at Bhaugulpore, where the plant thrives exceedingly well, as it does throughout Behar and the Upper Provinces, for a small supply of seeds with instructions as to the mode of cultivating the plant at that station. These were obligingly furnished, and in 1834 having strictly followed them I was rewarded with an abundant supply of tolerable sized artichokes. In the following year I obtained a further supply of seed from Bhaugulpore, and distributed it among my friends; and also to the principal Native gardeners who supply the Calcutta markets, giving to all the instructions for their cultivation which I now send to you. As an encouragement also to the Native gardeners I promised to give each of them a reward, if they produced at the proper season a half dozen of good artichoke heads. This year I have met with the same success that I did in 1834; and the Native gardeners having brought me some very fine specimens of heads, I rewarded them as I promised, and am quite certain, that if the Society would do so also, the markets would be amply supplied with this fine vegetable.

Mode of cultivating the Artichoke Plant.

In the last week of August, sow the seed in pots, and shelter them from the rain. One month after transplant them from the pots to the garden, still keeping them sheltered from rain, and in the end of October, or first week of November,

transplant them a second time in rows a cubit from each other, and they will produce heads about the end of February, which will be in perfection in March and April. They require a light rich soil of good depth, but no particular care after transplanting a second time. Any lateral head springing from the sides of the stems bearing the main heads should be removed to encourage the first formed head to attain the full size.

(Signed) TREVOR PLOWDEN.

Calcutta, 30th April, 1835.

আরটি চোক অর্থাত হাতির চোক চারার চাষ করিবার ধারা।

আগষ্ট মাসের শেষে কোন পাত্রে ইহার বীজ রোপণ করিতে হয় এবং যাহাতে বৃষ্টির জল না লাগে এমত রূপে আচ্ছাদন দিয়া রাখিতে হয় পরে একমাস গত হইলে ঐ পাত্র হইতে বাগানে লাড়িয়া রোপণ করিতে হয়। অথচ বৃষ্টির জল যাহাতে না লাগে এমত সাবধানে রাখিতে হয় আর অক্তোবর মাসের শেষে কিম্বা নবেম্বর মাসের প্রথমে ইহারদিগকে একং হাত অন্তর সারদিয়া পুনরায় স্থানান্তরে রোপণ করিতে হয় তাহাতে ফেব্রুয়ারি মাসে ফুলধরে যাহা মার্চ ও এপরেল মাসে পরিপক্ক হয় ইহার ভালো মাটিতে অধিক খনন আবশ্যক করে কিন্তু দ্বিতীয়বার স্থানান্তরে রোপণের পরে আর তদারক আবশ্যক করেনা যদিস্যাত অন্যফুল সাবেক ফুলের বোঁটার পাশদিয়া নির্গত হয় তবে তাহাকে নষ্ট করিতে হয়। যে হেতু নষ্ট নাকরিলে সাবেক ফুল পুনরূপে ফুটেনা ও পুর্ণ আকৃতি পায় না।

LXXIX.

REMARKS ON ASSAM.

Communicated by Mr. Hugan to Captain Jenkins on the 15th April, 1835.

MY DEAR SIR,—I have the pleasure of sending you a few remarks on Assam, which I hope will give your friend a general idea of the province should he (or any one else) be thinking seriously of giving the province a trial. I shall be most happy to answer any more minute enquiries he may wish to make previously to visiting it himself; this is of course the best way of ascertaining what could be done. When I was in my

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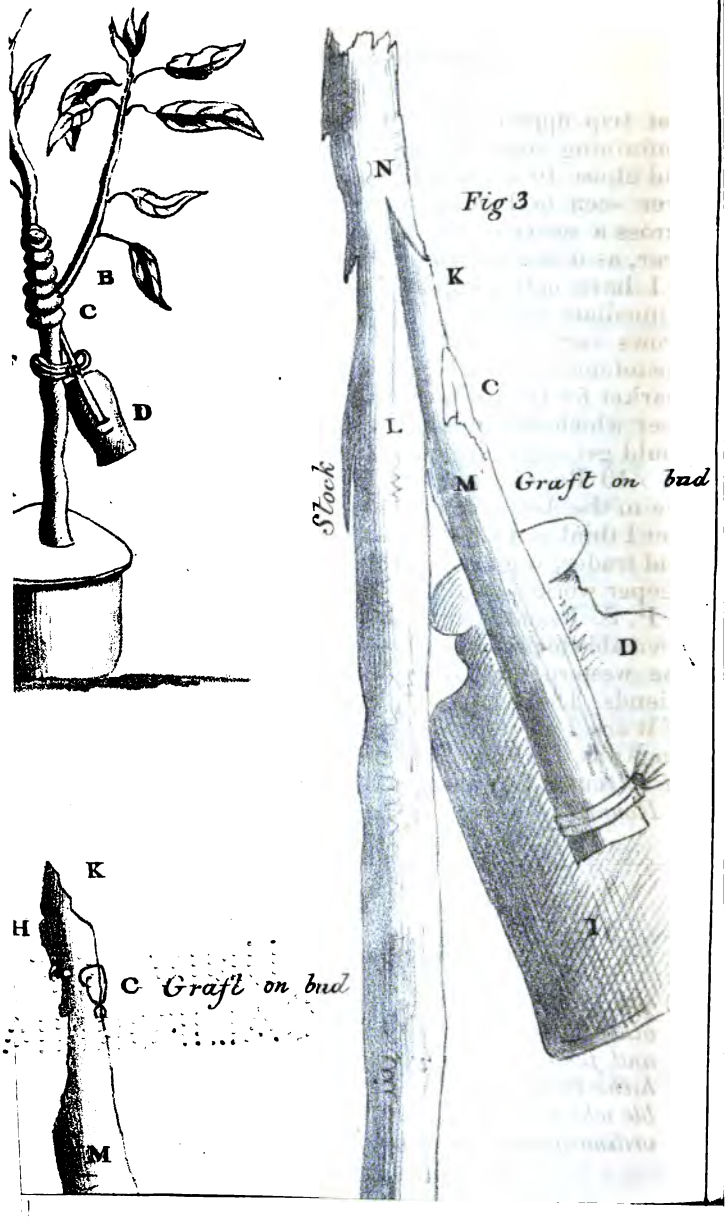
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Fig 3
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last trip opposite the Singoree hill I could show him a *chur* containing some 50 square miles out of which he could pick and chuse 10 or 15,000 *beegahs* of as fine indigo lands as I have ever seen in Bengal, and opposite the *chur* on this side and across a sootee of the Berhampootur navigable almost all the year, as many beegahs of lands fit for sugar (or indigo also.)

I have only mentioned what I am confident would have an immediate success. I have said nothing of safflower which grows very well, but the cultivation of which has been nearly abandoned, and which the ryuts would resume on getting a market for the produce, of the hides and horns of buffaloes and deer which they would not throw away if they knew that they could get something by them. Indigo seed which sells at from 8 to 10 Rupees in the lower provinces would be very profitable to the Assam ryut, could he dispose of it at 2 Rupees. In fact I think a man who would settle in Assam as a manufacturer and trader, would find that the country was a mine which the deeper worked would yield the more and in greater abundance.

P. S. I send you some of the indigo and all the seed I have been able to procure at present. The latter is like that got from the western provinces; I intend to send some to my planter friends. The Assamese have another kind of indigo;* the leaves of it are 2 inches broad; it is not grown from seed but from cuttings; as it is very common I have no doubt you will find lots of it round Gowahattee. The Assamese name for indigo is, "*Rounn.*"

LXXX.

ON GRAFTING AND BUDDING.

A new method of budding or grafting, not intended to supercede other modes, but one that may be practised in aid of the art, and found useful on many occasions, with such trees as have hitherto been grafted, "by approaching" only: and applicable where circumstances prevent or render the execution of the ordinary mode inconvenient.

By Lieut. Col. D. Presgrave.

The general mode of grafting mango stalks is "by approach" which is found to be perfectly efficacious and easy to accomplish in such situations where the tree (from which the

* The Ruellia carnosa.

grafts are required) belongs to and is in the immediate vicinity of the person's premises who is desirous of obtaining such grafts, because he can at his option raise scaffoldings for supporting the pots containing the stalks, and by daily inspection secure the necessary attention of his gardeners to the object in view; but there are many situations where this mode is not only inconvenient, but cannot be accomplished.

Feeling this inconvenience, I for several years tried to propagate particular sorts of mango trees by budding in every way I read or could think of, but without effect: until I hit upon the method herein explained.

I have frequently observed that cuttings from several kinds of trees would not strike root: although, when planted in moist ground they not merely preserved life, but threw out leaves and small branches, and notwithstanding these thriving symptoms, protracted for a month or two, the cuttings have ultimately withered, and on being withdrawn from the earth, shewed no appearance of roots, or even signs of granulation preparatory to that effort of nature.

Observing that mango sticks under certain circumstances, if thrust into the ground in the rainy season appeared to preserve life for a considerable time, it occurred to me, that if the upper extremity of a stick, fresh cut (from a mango tree) was grafted, by nicely fitting it into a seedling mango stalk, that it might be kept alive, by a supply of water, attached by means of some vessel to its lower end, for a sufficient length of time to admit of its uniting permanently to the stalk, upon precisely the same principle that the stalk and graft unite in the ordinary mode of grafting "by approach."

In "grafting by approach," the upper extremity of the inserted branch is left long, above the juncture on the stalk, to form the new tree; in this new mode the upper end of the branch is cut off as at K. in figs. 2 and 3, and is inserted in the stalk, the cutting being so managed that only a bud (one that promises to shoot into a branch) is left, at about half an inch from the upper end of the graft, which (bud) is to form the new tree; in this the process resembles that of budding more than grafting.

The sketch will shew more clearly what is intended. Fig. 1. A, a mango stalk grafted or budded, B, the shoot which is to form the new tree, grown from the bud C. D, a bottle or phial in which is inserted the lower end of the cutting or graft; sand is to be poured in, to about half the depth of the bottle, and the bottle to be filled up with water. E E is the lashing

that secures the graft or bud to the stalk: first and next to the bark is applied a narrow tape (say one-fifth of an inch broad) which has been steeped in melted bees' wax (and whilst warm drawn between two pieces of stick to take off the superfluous wax). The tape is bound firmly round, and from one end to the other of the joining, so as to draw the parts firmly together, taking care to leave the eye or bud exposed: in fixing the one into the other, the barks of both must be made to unite accurately, particularly the upper part at K, for on this success will in a great measure depend.

The waxed tape, very efficaciously, if properly applied, keeps out the air from the juncture, as it does also the wet: over the tape, coarse string (sootillee) may be wound, which will keep out the heat of the sun in the hot, and the frost in the cold weather. F is another string which suspends the phial by the neck to the stalk. Fig. 2. Sections of the stalk and graft, shewing how the one is hollowed out at G to receive the latter as cut to fit at H K; the length from L to N may be about 1½ to 2, and from L to I about 6 inches. C, the eye or bud which is to be the future tree. Fig. 3. shews on a still larger scale, the graft and stock as filled before, lashing and the position of the bottle. I is a wire drawn round the lower end of the cutting or graft and twisted tight (with pincers); it is intended to check the descent of the sap between the bark and the wood. In cutting out the hollow on the stock to receive the graft, the bark should not be cut lower than L, but to enable the graft to fit nicely, the graft may be cut away towards M.

The operation is best performed in a cloudy morning and damp atmosphere, it should be done with a sharp knife (not haggled) and with all celerity consistent with the proper adjustment of the parts, especially the bark. The best season is perhaps the commencement of the rains, when the mango trees appear to be in a vigorous state and full of sap. The stalks used by me, were about three years old, and the grafting was performed early in July; in about twenty or twenty-five days some of the buds threw out leaves, though others lay dormant for many months. At the time of grafting, the head of the stalk should be reduced, but not so as to deprive it of all its leaves: the water in the bottle should be changed at *least* once a week, and the bottle should not be removed, excepting to clean it, before the following rains; this mode of grafting might possibly be successfully applied to other kinds of trees, which are difficult to graft or bud.

After twelve months the stalk above the juncture, and the graft below it, may be carefully removed with a sharp knife, and a little bees' wax applied over the wounds with a warm iron.

Saugor, 25th May, 1835.

LXXXI.

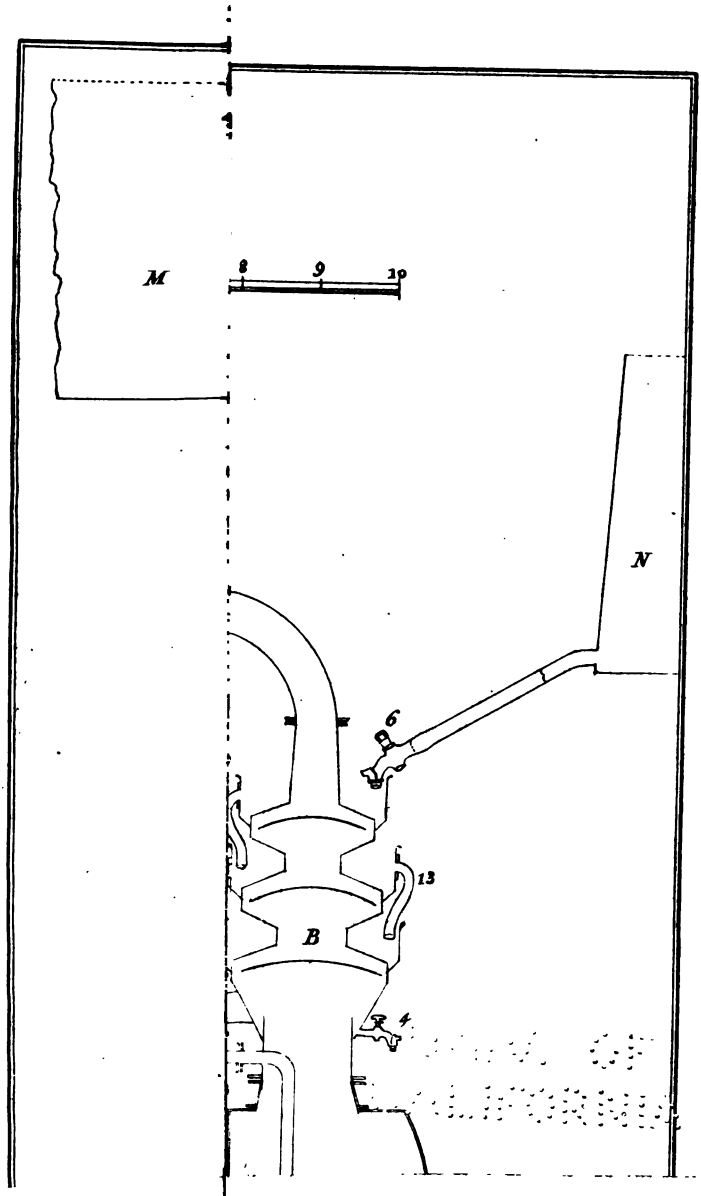
AN IMPROVED CONTINUOUS STILL.

To JOHN BELL, ESQ.

Offg. Secretary Agricultural Society.

SIR,—While Secretary to the Society I directed my attention to the various methods of distillation practised in England and France, as well as the colonies, in the hope of being able to construct a still, better adapted to this country, than any of those hitherto introduced, and thereby hold out an additional inducement to indigo planters to add sugar works and distilleries to their factories, where rum could be produced, of such improved quality, as would not only command a ready sale here, but become an article of increased exportation. I was also anxious to ascertain whether I could not, in an improved apparatus, manufacture from the arrow root plant now introduced here, and proved to be so prolific, a spirit perfectly free from smell, taste and flavour, for the purpose of transmission to London and Paris, where such a spirit is in great demand by the perfume distillers, and is always certain of commanding a high price.

Although in this last object I have hitherto experienced difficulties, arising, as I think, from impurities in the ferments procurable here, but which may be removed, I yet persuade myself that, by a selection of parts from the apparatus of the most celebrated distillers in England and in France, and by a combination and new arrangement of these, with additions suggested by my own experience, I have completed a still, for the temperature and climate of India, on the principle of continuous distillation, (the only one which will pay,) which excels the English stills of Winter and Gorty, as well as those of Baglioni and De Rosne, the most celebrated in France, not only in the quality and quantity of spirit produced, from given materials, but in the economy of fuel and superintendence, and without being so liable as any of those I have men-



Von Zweemer, 1000.

tioned to get out of order. I have adopted Baglioni's admirable contrivance of making the boiler itself carry the rectifiers, but I have discarded his Archimedes's screw, which, though adapted to distillation from limpid wine, is quite unsuited to the viscid juice of the sugar-cane, and substituted Gorty's discs and water boxes, found to be so efficient. I have introduced from De Rosne, a separate wash heater, but I have rejected his vertical worm and endless cocks, and again substituted Gorty's discs and boxes. My still has nevertheless many parts which are entirely my own, both to correct and simplify, and which, though small in size, are not only important in themselves, but absolutely necessary to the perfection and regular working of the machine. I have on several occasions, lately, exhibited a working model of eleven gallons, which (for want of common wash) was supplied with water, containing 7½ per cent of alkohol, and, on each trial, it ran, when carefully attended to, at the rate of a quart every five minutes, of a strength varying from 15 to 25 per cent. over London proof; which would give within a trifle of 100 gallons of London proof rum in the 24 hours. But I do not offer this out-turn as what is always to be expected; and if a large still, on the same principle, would give only half as much proportionally, as these experiments show, every distiller knows it would greatly exceed the out-turn of any still now in use here.

What I offer is the result of careful study, and considerable experience, and as I sincerely believe the adoption of it would prove advantageous in every sugar manufactory in India, I do not hesitate to recommend it; nor do I know that I can do this more properly, or effectually, than by offering it through the Agricultural Society.

I am now superintending the construction of two stills, on the same plan, of 150 gallons each, for friends who have large indigo concerns, which I hope to have ready early in December next, and I shall be happy to show and explain them to any member of the Society who contemplates the establishment of sugar works. In the mean time, I have the pleasure to send you, for inspection, sketches and descriptions of the machine, as well as rules for working it. As I proceed with the large stills, some minute improvements may suggest themselves, and I shall have much pleasure in sending corrected plans of the whole, if my undertaking so far meets the approbation of the Society.

I am, Sir, your obedient servant,

C. K. Robison.

9th November, 1835.

P. S. I do not send, with the sectional elevation, a ground plan of the machine itself, and necessary buildings, because it is capable of being arranged in any way to suit buildings and chimnies already erected. I chose the extended arrangement in the elevation, as it enabled me to show more distinctly all the separate parts; but where the distiller is not hampered by buildings already up, I would place the wash heater and worm tub on one side of the boiler, instead of at the end, thus;

The wash and water tubs can be placed *aloft* at the letters A and B.

C. K. Robison.

Description and Operation of Mr. C. K. Robison's Continuous Still.

A, a cylindrical copper boiler, 6 feet long, by 2 feet 6 inches diameter, divided into three portions inside, numbered 1st. 2d. and 3d., by partitions running from within an inch of the bottom, to within 4 inches of the top; having a man hole in the centre, and two apertures, with brass flanches, on which to place two rectifying columns; and also furnished with an emptying pipe, from the 3d division of the boiler, having a stop-cock, and a constant discharge pipe, without a stop-cock.

B and C, two rectifying columns, (to be placed on the boiler,) furnished with discs inside, and water boxes outside, for the purpose of condensing and returning to the boiler, the watery portion of the vapour arising therefrom; the column C having an envelope or jacket round the upper disc, instead of a water box, to receive the partially heated wash from the heater G, and transmit it, by apertures in the shoulder of the beak, down through the discs, to a collar at the lowest one, where it is received, and conveyed by a pipe to the bottom of column B, and then down into the 1st division of the boiler.

D, a swan neck, 5 inches diameter, to convey the partially rectified vapour of column C to the bottom of column B, where the vapours of both columns blend, and rise, through the discs and water boxes, in a rectified state, to the swan neck E.

E, a swan neck or beak, 6 inches wide, to convey the rectified vapour of both columns to the condenser, inside of the wash heater.

F, a condenser, 4 feet high, by 2 feet 3 inches wide, with alternate wide and narrow parts, and furnished with discs, to

condense the vapour before it reaches the worm, where it is cooled.

G, a wash heater, (into which is fitted the condenser F,) having a funnel to receive the wash from a tub, and a pipe to convey it, partially heated, to the top of column C.

H, a safety pipe, with a spherical or ball valve, to permit the escape, into the swan neck E, of any alkoholic vapour which may generate in the wash heater, but prevent the descent of vapour from the swan neck, into the heater.

I, brass cock of wash tub, with a crank and index suspended from it, to regulate the supply of wash to the heater, and from thence to the body of the still.

K, a pewter worm, fitted into a tub, with supply and waste pipes, in the usual manner.

L, a copper vessel to be placed at the vent of the worm, and constructed so as to admit of a thermometer standing in the outer case, and an areometre floating in the centre; by which the temperature and strength of the spirit, as it comes from the worm, is constantly and immediately known, and instructs the distiller in the proper supply both of wash to the still, and rectifying water to the boxes, as well as water to the worm tub.

M, a tub placed aloft, to supply wash to the still, and to be kept full from the fermenting vats, by means of a forcing or lifting pump.

N, a tub, also placed aloft to supply water to the rectifying columns, as well as to the worm tub; and furnished with the necessary conducting pipes and regulating brass cocks.

Cocks and Pipes.

1. Cock to discharge worm tub.
2. Cock to discharge wash heater.
3. Cock to discharge jacket on column C.
4. Cock at bottom of column B, to ascertain when steam first rises.
5. A pipe to discharge the heated water which has run through all the water boxes on the two columns.
6. A cock to regulate the supply of water to boxes on columns.
7. A pipe and cock to supply water to the worm tub.
8. Cock to discharge and clean the boiler.
9. Constant discharge pipe, the mouth 1 foot 6 inches above the bottom of the boiler.
10. A screw, to connect the condenser and worm.

11. Pipe to convey wash from the heater G, to the jacket on the head of column C.
12. Pipe to convey wash and low wines from the bottom of column C, to the first division of the boiler, the bottom of column B.
13, 13, 13. Pipes to convey rectifying water from the upper to the lower boxes, and from the water boxes of column B to column C.
14. Manhole of boiler, 13 by 10 inches.

Mode of Operation.

The wash heater is first filled with wash and the cock shut. The still is then filled with water, till it runs out at the discharge pipe; the fire is now lighted, and the water is brought to ebullition. When the distilled water runs out of the worm, the operation of distillation commences, by half opening the regulating cock of the wash tub, so as to give passage to the heater of only one-half the wash it is capable of furnishing, and at the same time causing the water to flow from cock 6 by degrees into the water boxes on the rectifying columns. The wash will immediately pass on from the head of the heater to the jacket on column C, and then fall through the apertures in the shoulder of the swan neck, upon the several discs below, till it reaches the collar at the bottom of the column, where it will be collected, and carried by a pipe, through the bottom of the other column into the first division of the boiler, now nearly deprived of its alkohol. From division No. 1, it will pass by the bottom into division No. 2, and in the same way into division No. 3, and having by this time lost all its alkohol, it will pass out by the discharge pipe, (with the same rapidity nearly that wash is supplied to the heater,) in the shape of waste or dunder.

By degrees the produce from the worm will show itself to be more and more alkoholic, until, by attending to the areometre, and thereby regulating the supply of wash and rectifying water, the distiller will be able to carry on the process for weeks together, and draw off the spirit at such strength above London proof as he inclines, keeping in sight that it should not be raised to a strength above what is best fitted for exportation or home consumption, which will be found to run from 10 to 20 over proof.

C. K. Robison.

9th November, 1835.

LXXXII.

MADDER.

To John Bell, Esq.

Offg. Sec. Agricultural and Horticultural Society.

Sir,—I have the pleasure to send for distribution a box containing madder seeds, commissioned by me from Smyrna, and just received from England, along with the following directions for the cultivation of the roots.

"The soil should not be too moist; preparations are first made by digging the ground in the month of March, to the depth of 8 or 10 inches, which is repeated in July and again in August, care being taken to remove all weeds. In March following, the seeds are sown in the manner of corn, and they spring up in May; meanwhile the ground should be well weeded. In July the plants wither, and in October the ground is carefully turned up round them to protect them from the cold in winter: in March following the ground is again turned up or raked, and in June the plants produce seed, and in July they are cut down in the manner of corn. In the third year the roots may be taken out of the ground, but are still small, and if left longer, the quantity is of course increased.

"They will produce for ten years or longer, but great care must be taken to rake and weed the ground every year; when the roots are taken up, they are exposed to the sun to dry and beaten to remove the earth, they are then packed in sacks."

With reference to the above, I may add that in France a crop is often reaped within eighteen months without injury to quality; the quantity being only smaller, and it would appear from details published in M'Culloch's Dictionary of Commerce, page 771, that where soil is impregnated with alkaline matter the root acquires a red colour, which is esteemed the most in France; whereas in other cases, the root is yellow which latter is preferred in England. The annual consumption of Great Britain is about 50,000 cwt. of madder, i. e. the roots pounded, sifted and dried, and of madder roots nearly as much. The price (including duty of two shillings per cwt. on madder, and 6*d* per cwt. on roots) was in 1834, as follows:—

Prepared madder from 16*s*. to	£3	18	0
Roots per cwt. .. £1 16*s*. to	£2	16	0

It might be advisable to distribute the present supply of seed in Purneah or in the neighbourhood of Nepal, where a species

of madder or rubia tinctorum is cultivated, i. e. the munjeet of commerce. A further supply of seed I can furnish if required.

I am, your obedient servant,

GEO. F. HODGKINSON.

Calcutta, 10th November, 1835.

Note.—This parcel of madder seed has been forwarded by Mr. Bell to Captain Dixon, Superintendent in Mhairwarrah.

APPENDIX.

REPORT

OF THE

AGRICULTURAL AND HORTICULTURAL SOCIETY

OF INDIA,

FOR THE YEAR 1835.

Read from the Chair, on Wednesday, the 13th January, 1836.

The introductory sketch given in a separate pamphlet and designed to precede Vol. II. Part I. affords a brief outline of the Society's progress from the middle of 1827 to the end of 1831.

A period therefore, of three years intervenes, which this report will not embrace, since it is proposed to review at present only the past year: but the vacuum, that would otherwise be left, occasioned by circumstances over which the present officers of the Society had no control, has been happily filled up by the report upon experiments carried on at Akra, recently published. This will occupy a prominent place in the Appendix to the 2d volume of the Society's Transactions, and obviates the relation of many unfortunate circumstances, that combined to paralize the operations of a Society, the success of which depended materially on the exertions of leading members, whose influence had reared it to the standard of extensive usefulness, which it had attained in 1831.

Turning therefore from the dark side of the picture, which we trust will be lost sight of, however opinions may differ as to the application of funds, and attention to the objects which the Society had in view in

maintaining an experimental farm, the truth contained in the late Dr. Carey's admirable address to the Society in 1828, that "a body of men "engaged in the same pursuit, form a joint stock of their information "and experience, and thereby put every individual in possession of the "sum total acquired by them all. *Even the mistakes* and *miscarriages of* "*its members when recorded, prove a source of advantage to the body,* "while the labours of every one communicate new energy to his associ- "ates, and thus produce exertions, which would never have been made, "had they continued in their individual capacity instead of uniting as a "body," has been forcibly realized, and precisely on the same principle that most new undertakings of magnitude prove a loss to the projectors, although a source of wealth to posterity.

This is the anniversary of our annual general meeting, and it must be a subject of pride and inward congratulation for every member to know, that his contributions, (whether in the shape of useful communications, presentations, or pecuniary aid,) have assisted to render the Society as prosperous as it has ever been, since its formation, in September, 1820.

This, considering the verge of almost bankruptcy, to which adverse circumstances, and the consequent loss of many of its oldest, and most influential members, had brought it some two years ago, must be highly gratifying to every individual, who has the agricultural welfare of India at heart, more especially as it has been achieved in so short a time subsequent to the crisis which shook its very existence, and affords an earnest of the lively interest now felt in the success of an institution, which has for its object the promotion of various interests, in which the prosperity of some millions of our Indian fellow-subjects is so intimately blended.

If the formation of this Society was considered a desideratum fifteen years ago, how much more are the united efforts of its members now called into requisition, through the victory science has gained within a few short years, which has brought about such a revolution in the commercial world, and as a natural result, in the resources of a large portion of the manufacturing classes throughout India!

It is impossible to contemplate this great change, without feeling that the efforts of a body of men associated for the purpose of contributing a fund of information, are peculiarly destined to be instrumental in the alleviation of human misery incidental to such sudden transitions.

It is not necessary to go very far back for an example, in order to

convey more forcibly the present helpless condition of the manufacturing interests of India; glance at the exports and imports of cotton goods, during the last twenty years will afford the best index to enquiry on this subject.

	Value in Sicca Rupees.			
	Bengal Cott. P. Goods exported.	*Brit. Cot. P. Goods imported.*	*Brit. Twist imported.*	*Total Brit. P. Goods & Tw. imp.*
Annual average of five years from 1814-15 to 1818-19, ..	1,26,07,361	8,81,543	Nil	8,81,543
Ditto from 1819-20 to 1823-24, ..	78,23,269	38,24,707	Nil	38,24,707
Ditto from 1824-25 to 1828-29, ..	41,80,023	54,03,241	13,03,002	67,06,243
Ditto from 1829-30 to 1833-34, ..	9,25,646	48,69,380	27,71,454	76,40,834

Thus, while the once grand staple export of Bengal, has experienced a decline within this series from an average of an annual export of a crore and a quarter of Rupees in value, to the insignificant sum of nine lakhs, imports of British Piece Goods and Twist have risen within the same period from an average of something less than Nine lakhs to the enormous value of Seventy-six and a half lakhs, which leaves a conclusive inference, that the manufacturing industry of India, which formerly found a vent through the Calcutta market as well as in providing for local consumption, has been displaced to the extent of a crore of Rupees and upwards annually.

In what possible manner can this immense gap be filled up? That it can be done, is obvious, but three grand obstacles require in the first instance to be removed.

The *first* is, the existence of transit duties on merchandise, which tends directly to weigh down agricultural industry. This evil has been so ably exposed, and so far recognised, that a Commission is now sitting under the appointment of Government, to ascertain the precise extent of immediate loss likely to accrue to the Revenue, by giving freedom to the internal trade of the country; and if possible to find a substitute less objectionable.

The *second* is, the unequal scale of duties levied in England, on some of the staple products of the East and West Indies, to the further depression of agricultural industry in this country, and against the conti-

nuance of which unjust tax, petitions from this and other Societies have been lately forwarded for the consideration of the Legislature.

The *third* is, the hereditary ignorance and apathy of the Natives of India, which deters them from entering with spirit on the task of improvement.

These, it will be confessed, are formidable barriers, that must be broken before the benefits dispensed through the medium of this Society can be brought to bear successfully upon the wide field, which invites the hand of skill to develope its hidden resources.

Who would have credited fifteen years ago, that we could have exhibited vegetables in the Town Hall of Calcutta, in point of quality equal to the choicest in Covent Garden? yet so it is, and the great amelioration that has taken place in horticulture is mainly ascribable to the encouragement and means provided by the Agricultural and Horticultural Society of India.

The progressive improvement in the higher and far more important branch of agriculture, must necessarily, owing to the impediments already adverted to, be slower; but not less certain.

The first step towards the attainment of this great national object has been effected by the publication of results obtained from experiments carried on at Akra.

Unfortunately some difficulty has been experienced in procuring cotton seed from America to keep alive the interest, which was beginning to be attracted to this grand source of commercial as well as agricultural wealth, and a silence has reigned indicative of an impression, that India must be content to produce the inferior staple, which stands outrivalled by every other country: but this is a chimera, that will soon be removed.

The confident impression of ultimate success entertained by members, who have bestowed much attention on the subject has led to resolutions, which will shortly bring, not only abundance of seed, but a regular supply for the future.

To the enlightened and liberal views of Lord William Bentinck, must be ascribed much of what will result through the agency of this Society, and it is with sincere regret, that we are obliged to record in our proceedings for the past year, the farewell address to a patron, who appreciated so cordially the usefulness of its labours.

The lively interest which his Lordship felt in agricultural improve-

ment while in India, is the best guarantee for a continuance of his influence at home, and the weight of whose opinion cannot fail at the present epoch to prove highly useful, when nothing but the preponderating influence of the West India interest has been able so long to keep down the scale in favour of injustice to this country.

The report of the Collector will be found to exhibit a state of prosperity, which was hardly to be anticipated, considering the events that combined to destroy the energy of this Society.

It cannot be too often and forcibly impressed on the attention of Members, that the success of our institution hinges especially on our ways and means.

Owing to the unfortunate circumstance of allowing quarterly subscriptions to run into arrears, a serious loss has been sustained by mortality, by departures from India, by loss of means, through the failure of Agents, by some chusing to withdraw without balancing dues, and by others reluctantly compelling the Society to erase their names.

While it is considered by the Collector necessary to advert to these calamities, it is satisfactory to observe that a considerable sum has been realized of arrears, that had been considered "desperate," and that the Collector entertains a confident hope that by degrees, more of these old outstandings will be recovered. The difficulty of tracing many accounts, and arriving at satisfactory conclusions, has rendered the operation of adjusting all as yet impracticable, and has in several instances given rise to a lengthened correspondence, which must have been exceedingly vexatious to members, who would doubtless have paid their subscription instanter on its being regularly claimed.

The Collector bears testimony to the general forbearance of all to whom he has applied, and ends his report by expressing a confident hope that the statement of another year will present a clear sheet, and include only the names of gentlemen whose accounts have been all paid up. At present the state of the list is such as to preclude him from recording in this volume an accurate return of members, although he is happy to announce an accession of *forty-four* names, since the 1st of January, 1835. This includes the re-election of some old members, and brings upon the strength of the Society other names, which had been lost sight of, but who on being called upon, under proper explanation, paid up their arrears most cheerfully.

This addition to the list, contrasted with the results of the four preceding years, presents a favourable aspect.

In 1831, the number of new members elected was, ...	21
In 1832, ...	19
In 1833, ...	11
In 1834, ...	13
Total elections in 4 years, ...	64
Average number, ...	16

hence an actual *increase* of 28 members in the last year 1835, indicates a renewed interest in the transactions of the Society.

On the other hand, the names *voluntarily* withdrawn amount to only *eight*, of whom four were returning to Europe, and when it is considered that many had at command a reasonable plea for withdrawing; their continuance bespeaks a confidence in the future, which it is hoped will be realized.

This renewal of confidence we are disposed to attribute mainly to the determination of the Society to give every possible publicity to its proceedings, and not a little to the abandonment of the Alipore garden, which although a source of gratification to a few, was nevertheless viewed by many who had long contributed to the fund, as weaning the attention of local Members from objects of higher importance; and expending their means on experiments in horticulture, which might be more usefully employed.

The publication of the Society's report upon Akra, was a prelude to the resolution for resuming the record of our transactions, and while the Committee of Papers, were engaged in selecting from a promiscuous mass of communications, which had accumulated since the 1st number of Vol. 2d had been published, it was discovered, that many valuable papers, supposed to have been mislaid, were actually printed and stored in Messrs. Samuel Smith and Co.'s Library, requiring only the addition of a few pages to complete the 2d number, which were soon worked up.

The press at Serampore has been actively engaged on the remainder, and it is expected that the 2d volume will be completed by the 1st of February, and bring down our transactions to the 31st December, 1835, after which the communications will be printed either quarterly or as often as the supply of interesting matter may warrant.

Amongst the many objects that have engaged the Society's attention during the past year the following may be enumerated.

1. The discovery of the Tea plant in Assam, which though strictly confined to the fostering care of Government, is nevertheless an object of great solicitude. The prosecution of this interesting question is so far connected with our operations that it has deprived the Society for a time of the valuable services of our most active and highly intelligent Secretary Dr. Wallich, who, it is hoped, will soon return, with honours, in addition to those he has already won.

2. Our attention has been called to the expediency of petitioning both houses of Parliament, on the justice of placing our products on a par with those of other countries to admit of their successful competition.

3. To the importance of securing immediate supplies of cotton seed from America.

4. To the necessity of providing against a recurrence of disappointment, in receiving vegetable seeds too late in the season.

5. To the great relief, that would be given to the operations of the Society by a repeal of the duties now leviable on seeds, importing and exporting by sea and land here and at the other presidencies, and by the grant of a free postage on the transmission of our transactions to non-resident members.

6. To the publication of the Society's report upon experiments at Akra, and to the renewed printing of their Transactions.

7. To the best method of improving and preventing frauds in the annual exhibitions.

8. To a revision of our rules, an amended copy of which will be found in the Appendix.

9. To the urgent necessity of bringing into a regular train of management, all matters connected with the Society.

Within the limits of our present report the Society has got rid of a great tax upon its funds, by the payment to Mr. Palmer's assignee of two thousand Sicca Rupees, in lieu of maintaining an unprofitable garden involving a monthly outlay of 130 Rupees per mensem for rent alone, the payment of which sum has been liberally continued by Government, as a set off against the losses sustained by the Society when so much distress was felt in Calcutta.

The announcement of the formation of a similar Society at Madras promises improvement in that part of India, and it is hoped, that the communication which has already been established, will lead to mutual benefit hereafter.

Assurances of the same desire to reciprocate useful information have been received and answered from the Bombay Society within the last twelve months, so that channels of communication being now established at each presidency, it is reasonable to expect, that much solid advantage will be dispensed through the medium of their respective and collective labours.

In addition to these a Society (branch) exists at Lucknow, which will be brought by degrees, into more intimate connexion with that of Calcutta.

The branch Society at Dinapore appears to have decayed, for want of support or some other cause.

The Society for the encouragement of Arts, &c. in London have presented to us a copy of their Transactions, Vol. I. Part I. of a new series. By a resolution passed at a general Meeting in the Town Hall on the 13th May last, some samples of silk and wool, (received from one of our most zealous members, Captain Jenkins, of Gowahattee,) have been forwarded for their opinion, with a letter from Dr. Wallich expressive of our desire to enter into an active correspondence with that most useful institution on matters connected with the objects of both.

The Philosophical Society of Philadelphia have also contributed to our library, by presenting several volumes of the Agricultural Society's Transactions of that city, with four separate addresses, and an interesting treatise on the use of salt as a manure.

It is hoped, that this brief outline of the Society's history for the past year, will not be without its use. If it proves satisfactory to the Society, it is proposed to publish regular annual reports in future.

It is presumed, that it must be agreeable to members at a distance to peruse a statement showing what has been done, is doing, and is in contemplation. They will thus be convinced moreover, from what has been effected, that adverse circumstances alone protracted the publication of their united essays to promote the objects of the Society, and now that a successful and determined effort has been made, they will be prompted to go on with fresh vigour in the field of usefulness which opens before us.

At the present time every individual is peculiarly called upon to add his mite of information to the general fund.

India, although a pearl of great price to England, is yet not only unprotected, but by the British Tariff is treated comparatively as a foreign state, while the productions of other countries which do not relieve the parent state of a tithe of her manufacturing industry, in proportion to India, are favoured by a much lighter scale of duties.

There can be no doubt, but that the change in the state of the cotton market by converting manufacturers into agriculturists combined with the alteration now in progress in the channel of providing silk has materially affected the interests of the agricultural community in this part of India. To endeavour to alleviate this state of things, must be a study alike interesting and important; the prospect is favourable, and it remains for the Agricultural Society to assist in raising the quality of our staple exports, and thus tempt the application of skill and capital, to such of our products as will, on equal terms fairly stand the test of competition with other more favoured countries.

Indigo is an example of what can be done with the aid of skill and industry, and in other staples similar results may be hoped for from similar exertions.

We now close this report with an earnest hope, that the promising prospects of the Society, will bring a still greater accession of members, and with them a new stock of information to our next anniversary Report.

(True Copy,)

JOHN BELL,

Offg. Secretary.

13*th January*, 1836.

COLLECTOR'S REPORT.

On taking charge of the office of Collector to the Agricultural and Horticultural Society of India in May, 1835, I found the accounts in a lamentable state of confusion.

My first business was to have a letter lithographed pointing out the special objects which the Society had in view, by concentrating their funds, and drawing attention to the state of accounts; and I avail myself of this opportunity to return my thanks to all those members with whom I have been necessarily brought into correspondence for the forbearance shown in cases, when many vexatious references were required to clear up doubts.

The result exhibited in the annexed statement will, I trust, be satisfactory to the Society at large.

In less than eight months the sum of Sicca Rupees Six thousand three hundred and twenty-three, eight annas and three pie (6,323, 8, 3) has been collected from members; and not an inconsiderable portion of this sum has been recovered from a list of bills, which had been set aside as "irrecoverable."

I am still sanguine (as time permits me to annalize accounts,) of considerably reducing the amount of old outstandings; meanwhile it is pleasing to observe, that no new accounts have run into arrears, indeed, every member is ready to pay his trifling quarterly contribution as it becomes due.

I trust that the next annual statement will be entirely void of all unsatisfactory accounts, and present a clear balance sheet.

It will be observed that the disbursements during the last eight months have been heavy, but exclusive of Sicca Rupees 977, 10, 9 expended for seed, several items amounting to a considerable sum in the aggregate have been paid, which had no reference to the past eight months.

The mode of investing the surplus funds, will, I hope, meet the approbation of the Society.

As opportunities occur, I purchase Company's paper, which is endorsed to the Secretaries and Collector, and lodged in the Government Agency Office in the name and on behalf of the Society.

The accruings of interest are regularly transferred by the Government Agent, as they fall due to the credit of the Society in the Government Saving's Bank, where they are left to accumulate with interest, until they amount to a sum sufficient to be reinvested.

From the increasing interest now felt in the success of this Society, I feel a confident persuasion that, ere long, we shall raise the amount of assets to a sum that will provide the current expences from interest alone.

The charges for advertising meetings, although apparently small, swell the annual expenditure considerably.

Three notices were formerly inserted in each paper, of a monthly general meeting. This item I have reduced to one notice in each paper, and when it is remembered that lithographed cards are regularly issued, in addition to the day of meeting being *daily* recorded under the head of *public engagements*, I would beg leave to suggest either the suppression of cards or that of the notice heretofore given in the papers, which appears to me unnecessary.

JOHN BELL,
Collector.

1*st January*, 1836.

Statement of Receipts and Disbursements from the 18th May, to 31st December, 1835.

RECEIPTS.

From Members, arrears and current subscriptions collected from 18th May to 31st Dec. 1835,	6,323	8	3			
„ Messrs. Willis and Earle, refund of cash advanced in 1833 for the purchase of cotton seed	1,000	0	0			
„ Government monthly allowance to the Society for seven months, at 130 Rs. per mensem,	910	0	0			
„ Cape seed (surplus) sold at the Town-Hall,	380	0	0			
	Sa. Rs.			8,613	8	3

DISBURSEMENTS.

By *Cape seed* and charges,	690	1	3			
„ *Bombay seed* and charges,	106	1	6			
„ *Patna seed* purchased for the Horticultural Society of Madras,	181	8	0			
„ *Madras potatoes* for six baskets purchased from Spence and Wetherill, at 5 Rs.	30	0	0			
„ *Salaries and Wages*,	890	10	6			
„ *Claims* against the Society prior to May 1835, since paid,	371	4	0			
„ *Advertisements*, Printing Circulars, Stationery, blank books, since the 1st May, 1835,	276	6	9			
„ *Freight* and landing charges on twenty baskets of Bangalore potatoes,	21	10	0			
„ *Postage* and banghy on letters and parcels sent as per dawk book,	66	11	6			
„ *Postage* on letters received,	3	0	0			
„ *Sundries*,	21	3	3			
„ *Premium* and interest paid on the purchase of Government Securities,	52	14	6			
Total expended since 18th May, 1835,				2,711	7	3
„ *Amount* invested in Company's 4 and 5 per cent. paper,	4,000	0	0			
„ *Balance* of cash on 31st Dec. applicable to the purchase of cotton seed ordered and to the payment of prizes, in January,	1,902	1	0			
				5,902	1	0
	Sa. Rs.			8,613	8	3

Town Hall, 1st January, 1836.

Errors and omissions excepted,
JOHN BELL, *Collector.*

Memorandum of the Society's fixed Assets.

Amount invested in Company's paper lodged in the Government Agency Office,	11,000	0	0			
Accruings of interest thereon deposited in the Government Saving's Bank (exclusive of current interest) on the 31st Dec. 1835,	365	1	0			
	Total Sa. Rs.			11,365	1	0

PROCEEDINGS

OF THE

AGRICULTURAL AND HORTICULTURAL SOCIETY

OF INDIA.

Wednesday, 14th January, 1835.

The first General Meeting of this Society for the year 1835, was held this day.

James Kyd, Esq. in the Chair.

Seventeen members present.

Dr. Wallich stated that he had been instructed by Mr. Bagshaw, to tender his resignation as Collector, which was received by the meeting with regret, and the thanks of the Society were unanimously voted to that gentleman.

Dr. Wallich at the same time begged to resign his own situation of Officiating Secretary, owing to the multiplicity of his other avocations, and the distance of his residence.

On the motion of Mr. Pattle, it was *resolved*, that Dr. Wallich be specially intreated to withdraw his resignation, and continue to afford to the Society the benefit of his valuable services, if not permanently, at least until the return of the President, Sir Edward Ryan, from the Cape of Good Hope. Dr. Wallich accordingly acceded to the general wish of the meeting.

The meeting then proceeded to the election of Office Bearers for the year 1835, when the following gentlemen were chosen :—

President.

The Honourable Sir Edward Ryan.

Vice-Presidents.

Colonel Dunlop.
N. Wallich, Esq. M. D.
C. K. Robison, Esq.
His Highness the Nawaub Tahower Jung.
Baboo Radhakant Deb.

Secretaries.

N. Wallich, Esq. M. D.
Baboo Ramkomul Sen.

Collector.

Baboo Ramkomul Sen.

General Committee.

Major Honywood.
Dr. Strong.
Dr. Bramley.
Messrs. J. Willis.
„ J. Pattle.
„ W. Earle.
„ W. Storm.
Messrs. C. R. Martin.
„ J. Bell.
„ D. Hare.
„ Jas. Kyd.
„ H. M. Low.
Baboo Kasheenath Mullick.
Baboo Radhamadhub Banerjee.

The Office-Bearers to be members of the above Committee, ex officio.

The office of Foreign Secretary having become vacate by the absence from Calcutta of Mr. Piddington, the appointment of another gentleman was considered unnecessary, and the thanks of the Society were ordered to be returned to Mr. Piddington for his valuable services.

From the altered state of the affairs of the Society, with reference to the experimental farm at Akra, and garden at Alipore being now abandoned, the continuance of Sub-Committees appeared to be no longer requisite; all former Committees therefore were declared *ipso facto* extinct.

On the motion of the Secretary,

Resolved, that the salary of a Clerk to the Society be increased from 60 to 100 Sicca Rupees per mensem.

The acceptance of two thousand Rupees by the Assignee of Mr. Palmer's estate in full of all demands against the Society, on account of the lease of the garden at Alipore, was announced by the Secretary, who was directed to communicate the same to Government.

Moved by Dr. Strong, seconded by Mr. Martin, and carried by a large majority.

That considering the speedy equalization of the duties upon sugar, coffee, tobacco, and other products of this country, with those of the West Indies, and the Mauritius, to be of vast importance to the agricultural interests of India; this Society do meet on the 28th instant for the special purpose of taking into consideration the propriety of petitioning both Houses of Parliament on the subject.

Read a report upon Cotton grown by Lieut. Rutherford in Myrung, from Mr. James Findlay, dated 27th December, 1834. Also, a letter from Capt. Sage, Secretary to the Dinapore Branch Society, dated 20th December, acknowledging receipt of some vine cuttings.

Mr. Samuel Smith was elected a member of the Society.

Wednesday, 28th January, 1835.

A Special Meeting was held at the Town Hall this day.

Sir Robert Colquhoun, in the Chair.

Twenty-two members present.

Read the resolution passed at the meeting of the 14th instant, relative to the convening of the present special meeting.

Resolved, on the motion of Dr. Strong, seconded by Mr. Kyd, that the Society do petition both Houses of Parliament, according to the foregoing resolution.

Read the draft of a petition prepared by Dr. Strong.

Resolved, on the motion of Dr. Strong, seconded by Baboo Dwarkanath Tagore, that the draft be referred to a Committee for the purpose of being finally considered, and the proper petitions prepared.

Resolved, on the motion of Mr. Low, seconded by Dr. Wallich, that Sir Robert Colquhoun, now about to proceed to Europe, be requested to be the bearer of the petition.

Resolved, on the motion of Mr. Hare, seconded by Mr. Smith, that the petitions be engrossed in duplicate.

Resolved, that the special thanks of the meeting be given to Sir Robert Colquhoun for his able conduct in the chair.

Wednesday, 11th February, 1835.

A General Meeting was held this day.

C. K. Robison, Esq. V. P. in the Chair.

Sixteen members present.

Read the following Minute of the Committee appointed at the special meeting, which was held on the 28th ultimo.

Resolved, that the petition read at the special meeting of the Society on the 28th January, with the alterations now made be adopted, and that it be forthwith made out in duplicate, and circulated for the signature of the members.

Resolved, that a letter be addressed to Earl Fitzwilliam and Mr. Whitmore on this occasion.

Resolved, that a copy of the petition be sent to Lord William Bentinck, with a request that his Lordship will support it in the House of Commons.

Resolved, that Sir Robert Colquhoun be requested to fill up the blanks in a lithographed letter signed by the Secretary, of which several copies have been supplied for distribution among members of both Houses of Parliament.

Resolved, that the Proceedings of the special Committee, and the petition and letter therein referred to be adopted.

Resolved, on the motion of Dr. Wallich, seconded by Sir Robert Colquhoun, that thanks be returned to Dr. Strong, for his valuable aid in preparing the petition, and in zealously forwarding the arrangements connected with the subject.

Resolved, on the motion of Mr. Low, seconded by Dr. Wallich, that a Committee be appointed to enquire into, and amend wherever necessary, the existing rules of the Society, and to report their proceedings at the next general meeting for approval.

Resolved, that the following Gentlemen constitute the Committee, viz. Messrs. C. K. Robison, W. Storm, H. M. Low, and Dr. Wallich.

Read two letters from Government to the Secretary, dated 31st December, 1834, and 22d January, 1835, in reply to a request from the Society to be permitted to despatch seeds or plants to the Western Provinces by the Government steamers free of expence intimating acquiescence under certain conditions, and calling upon the Society for a report on the

application of a pecuniary grant which was made by Government, for an experimental farm at Akra.

The Secretary announced the payment of 2,000 Rupees to Mr. Palmer's assignee, being the sum agreed upon as a compromise to enable the Society to disengage itself from all further claims on account of the Alipore garden.

The Secretary further stated, that he had realized and paid into the Bank of Bengal, Sicca Rupees 2,000, being the amount of annual donations by Government for the year 1834 and 1835, and also the receipt from Government of Sicca Rupees 427, 11, 10, to meet the rent of Alipore garden from April to the 9th July, 1834, when it was abandoned by the Society.

And, that in compliance with instructions contained in paragraph 2, of the letter from the Revenue Department, dated 21st July, and read at a meeting held on the 30th of that month, he had reported to Government that the Society had finally disengaged itself from all further claims on them for the said garden, and lastly, that according to the authority contained in the same letter, he had requested payment of the monthly sum of 130 Rupees from the date of the relinquishment of the garden until the 31st January, 1835.

Read a letter from Mr. Bonnevie, dated Calcutta, 29th January, presenting a small sample of Sea Island cotton grown by him in Rungpore, from seed received from Mr. J. Palmer, and applying for more seed.

Thanks were ordered to be returned to Mr. Bonnevie, and a supply of seed to be sent.

Another sample of Sea Island cotton was presented, in the name of Mr. C. Hamilton, of Tirhoot, with a note from Sir Robert Colquhoun, wishing his name to be withdrawn from the list of subscribers.

Resolved, that thanks be returned to Sir Robert Colquhoun and Mr. Hamilton.

Resolved, unanimously on the motion of Colonel Dunlop, V. P. seconded by Dr. Wallich, that the warmest thanks of the Society be presented to Sir Robert Colquhoun for his indefatigable and valuable services during the period in which he has been a resident member, and further as a mark of the high estimation in which those services are held by the Society, that his name be inscribed in the Society's books as an *honorary* member.

A sample of Daoodkhanee, or wheat, the produce of Colonel Gardner's estates, was presented.

The Secretary laid on the table a statement of the distribution of pecuniary rewards and medals among mallies who cultivate for the Europe bazars, at the exhibition which took place at the Town Hall, on the 22d January, and also a statement of the distribution of a quantity of yams* among mallies, which took place at Fort William under the superintendance of Sir Robert Colquhoun on the 27th December, 1834.

The Committee resolved that an exhibition of the vegetables, and fruits reared for the native markets, should be held to-morrow, the 12th, at the Town Hall, for the distribution of medals, and pecuniary rewards.

The following Gentlemen were elected members of the Society:—

Lieut. Col. Cobbe, Messrs. A. F. Donnelly, C. Trebeck, J. M. Seppings, J. D. Smith, R. E. Blaney, W. Anley, H. Inglis, W. Graham, W. P. Watson, W. Hamerton, J. W. Masters, and Baboo Kasheepersaud Ghose.

Wednesday, 11th March, 1835.

A General Meeting was held this day.

The Honourable Sir E. Ryan, President, in the Chair.

Sixteen members present.

The proceedings of the last meeting having been read and confirmed, the President called attention to that part of the letter from Government just read, which had reference to the application of Funds granted to the Society for the establishment of an experimental farm at Akra, and urging strenuously the united efforts of the Committee† originally formed to draw up a report.

Resolved, with the view of aiding and accelerating the endeavours of the Akra Committee to supply without delay, the requisite Reports, that Lieut. Col. Dunlop, V. P. and Mr. Minchin, be requested to join the Committee.

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* *Tenasserim.*

† Messrs. Jos. Willis, W. C. Hurry, and W. Patrick.

The President next adverted to the approaching departure of the Society's Patron, Lord William Bentinck, and suggested the propriety of expressing their sentiments on the occasion by a suitable address.

Resolved, that an address expressive of the Society's sentiments be presented to Lord William Bentinck.

Resolved, that Messrs. Minchin and Strong be requested to prepare the address.

Resolved, that a special meeting be convened on the 13th instant to approve of the address.

The Committee appointed at the last meeting submitted a draft of the Regulations of the Society as revised by them.

Resolved, that the draft be adopted as the Regulations of the Society, that it be forthwith printed and distributed among the existing members, and that each new member be furnished on his election with a copy.

The President laid on the table a draft of queries, received from Mr. Piddington, connected with his proposed work on Indian Gardening.

Resolved, that the draft be referred to the Committee, and that thanks be returned to Mr. Piddington.

Read a letter from Mr. Royle, dated London, 11th September, 1834, presenting a parcel of Egyptian wheat, and recommending its introduction into such parts of India as might have a command of climate, similar to that of Egypt.

Resolved, that thanks be returned to Mr. Royle for his interesting communication.

Portions of this wheat were sent to Dr. Falconer at Saharunpore, to Captain Sage, Dinapore, to Col. Gardner, Khasgunge, to Lieut. Col. Presgrave, Sangor, and to Captain Jenkins, at Gowahattee.

Some seed potatoes were presented by Captain Leach which he had brought out from England.

Read a letter from Mr. Vaupell, Secretary to the Bombay Agricultural and Horticultural Society, dated 14th February, 1835, conveying the concurrence of that Society in the expediency of petitioning Parliament for equalizing the duties on East and West India produce, and the intention of that body to take up the question on the receipt of a copy of the Calcutta petition, which Dr. Wallich had promised to forward.

Mr. Vaupell, expresses the desire of the Bombay Society to reciprocate in the interchange of seeds and plants, and intimates the successful

introduction of the Otaheite sugar-cane, in that part of India, notwithstanding the prejudices of the natives to take advantage of so superior a kind.

Read copy of a letter from Mr. H. B. E. Prere, to Mr. Vaupell of Bombay, dated Parell, 6th January, 1835, containing some interesting remarks on a plant called "Sulla" or "Uidna," of which Mr. Vaupell had forwarded some seed to the Society. The herb grows luxuriantly on the Island of Malta, where the soil is confined to a mere crust covering the rocks, and forms a most valuable fodder for cattle both in its green and dried state.

The Secretary intimated that one of the two small parcels received from Mr. Vaupell, contained the Sulla or Uidna also called "French Honey Suckle" San foin d' Espagne (Hedysarum Oronarium) which is extensively cultivated in some of the warmer parts of Europe and in the Mediterranean; the other contained the seed of Scurpuirus Sulcata, (erroneously superscribed Uidna or "French Honey Suckle," which he believes is no where cultivated, except as a curiosity.

Read a letter from Major Dickenson, dated Akyab, February 12th 1835, stating the disinclination of the inhabitants of that province to cultivate exotic tobacco.

Major Dickenson intimates their strong prediliction in favour of the Sandoway tobacco over all other kinds.

Read extract of a letter from Mr. Traill, dated Kemaoon, February 13th, 1835, giving a full description of the mode of culture adopted there in regard to ginger.

Read extract of a letter from Mr. J. Jackson, dated Ghazeepore, March 2, 1835, acknowledging receipt of vine cuttings forwarded by direction of the Society and intimating the distribution of them to the Residents of that place.

The thanks of the Society were ordered to be returned for these various contributions.

W. Bracken, Esq. was proposed a member of the Society by Dr. Strong, and seconded by Dr. Wallich.

Friday, March 13th, 1835.

A Special Meeting was held this day.

The Honourable Sir E. Ryan, President, in the Chair.

Twenty-four members present.

Read the resolution passed at the meeting of the 11th convening the present special meeting.

Read the draft* of an Address to Lord William Bentinck, and after some slight alterations,

Resolved unanimously, that the draft be adopted and engrossed, and signed on behalf of the Society by the President, who had undertaken to present it to his Lordship.

Wednesday, April 8th, 1835.

A General Meeting of the Society was held this day.

The Honourable Sir E. Ryan, President, in the Chair.

Twelve members present.

The President informed the meeting that he had presented the Address voted by the Society to Lord William Bentinck, and that his Lordship had previous to his departure returned a reply† which was read.

It was then moved by Sir E. Ryan, that the Society is in a peculiar manner called upon to pay attention to the suggestions in regard to the superior high-wheeled cart and large sized bullock in use at the Madras Presidency, which have been especially brought to the notice of the Society by their late noble Patron, in the reply just read.

Resolved, that Lieut. Col. Dunlop, Major Honywood, Mr. Kyd, and Mr. Minchin, be requested to form themselves into a Committee for the purpose of considering and reporting upon those objects.

Mr. Low, the late Deputy Secretary, and Dr. Wallich, adverted with regret to the accidental omission which had occurred on the occasion of the election of Office-Bearers at the Anniversary meeting held in Janua-

* This Address is published in the present volume.

† Lord William Bentinck's reply will be found in this volume.

ry last, in leaving out the name of Baboo Ramkomul Sen as the Society's Native Secretary, an office which had been productive of much benefit to the Society. These gentlemen likewise suggested the propriety of relieving Baboo Ramkomul Sen of the duties of Collector, his time being fully occupied by official and other avocations; and to transfer them to Mr. Bell, who had politely agreed to undertake them.

The motion having been put from the chair and carried unanimously,

Resolved, that a letter be addressed to Baboo Ramkomul Sen, expressive of the Society's regret at any circumstance having occurred to deprive them even temporarily of his valuable services, by which they have benefited during so long a period, and for which they feel themselves highly obliged to him, and that the letter be accompanied by a copy of this Resolution, and the preceding minute; finally, that Mr. Bell's offer be accepted, and that the office of Collector be transferred to him.

The Secretary laid on the table some very interesting communications addressed to Dr. F. P. Strong, from parties in England, including a Minute of the Royal Asiatic Society of Great Britain and Ireland, on the subject of some samples of coffee, the produce of his experimental garden at Russapugla, which he had forwarded for the opinion of brokers and others.

The general impression left upon the minds of those, to whom the samples had been referred for test, seemed to be that Dr. Strong's coffee had been grown from *Bourbon* seed. The beans were clean, and well flavoured, but weak, and their appearance, in a commercial point of view, was rather unfavourable, indicating spots, and indentations, arising probably from want of experience in the process of curing. The coffee was considered decidedly superior to that of Malabar, which is consumed extensively in England being mixed with the Mocha.

The Royal Asiatic Society offer the following comparative rates of value.

Dr. Strong's coffee estimated about 63 per cwt.
Java ..... „ ..... „ .. .. 56 at 60 per ditto.
Malabar ..... „ ..... „ ..... 58 at 62 per ditto.

Read extract of a letter from Captain Jenkins, of Gowahattee, dated 29th December, 1834, relative to a sample of silk produced by the worm which feeds on the Palma Christi of Assam, which accompanied the communication.

The material spun by this worm, which is represented of a hardy constitution, and easily domesticated, is made into thread by the aid of the hand and thigh, and woven into large heavy chudders, which are so durable, as actually to descend from generation to generation in perpetual wear.

Resolved, that Captain Jenkins be requested to favour the Society with a specimen of these heavy chudders.

Read a letter from Col. Gardner, of Khasgunge, dated 20th March, 1835, acknowledging the receipt of the Secretary's letter of the 11th February, on the subject of the Daoodkhanee wheat, a sample of which was presented at the Society's meeting in February.

Col. Gardner states on information received from the Dehli people that Daoodkhan brought it from the Dekkan, and not from Lahore, that this species was formerly much cultivated in the Bareilly district, and is still used in the Agra zillah; it is extensively consumed, in making the sweetmeat, called "Jellabee," but the ryuts are averse to cultivate it from the small returns it yields in comparison with other sorts. It is in great demand by the more affluent, and for marriage ceremonies, &c.

Col. Gardner had received and tried the Egyptian wheat, but it did not germinate. He had been equally unsuccessful with the grasses sent to him by the Society, which all failed, excepting a few plants from the Italian Rye grass, but Col. Gardner had great hopes of succeeding with the *Guinea* grass. He states, "At the commencement of the rains "I mean to plant 200 beegas in the dry sandy soil of this place, and "the like quantity in the *terrai* near the Ganges. From the experi- "ments I have already made, I have every reason to hope for success: "should I succeed, it would prove the greatest gift that could be bes- "towed on the people of the Upper Provinces."

Col. Presgrave, in a letter to the Secretary, dated Saugor, 16th February, intimates the receipt of wheat seed sent by the Society, but in so wet and damaged a state as to be useless.

The grass seed was in good preservation, and the result of his endeavours to introduce it was promised.

Read a letter from the Secretary to Government, Revenue Department, dated 11th March, and another from the Comptroller of Government Vessels, dated 3d April, on the subject of Freight charged on some plants and seeds, forwarded by the Society to the Western Provinces.

Read a Circular of Queries, which had been printed from a draft by Mr. Piddington, with a view to concentrate information on the Principles of Gardening which that gentleman had undertaken to edit.

Presented by Col. De Hezetta two small bottles of Havannah Tobacco seed.

Presented by Dr. Strong, a ball of Shan tea used in the Burman country.

Presented by Mr. Piddington, a small box of American seeds.

Thanks were directed to be presented for the above communications and donations.

W. Bracken, Esq. proposed at the last General Meeting, was balloted for and elected.

The following gentlemen were proposed as members:—Captain Leach, Messrs. W. F. Gibbon, C. H. Blake, and Donald Campbell.

Resolved, that during the hot season, the meetings take place at ½ past 9 A. M. precisely.

Wednesday, May 13*th*, 1835.

A General Meeting was held in the Town Hall this day.

The Honourable Sir E. Ryan, President, in the Chair.

Sixteen members present.

Col. Dunlop and Mr. Minchin reported on behalf of the Committee who had undertaken to draw up the report upon Akra, that measures were now in progress, and that Mr. Willis had offered to prepare it finally.

Resolved with a view of aiding the Committee, now consisting of Col. Dunlop, Messrs. Minchin, Hurry, Willis, and Patrick, for the special purpose that two more gentlemen be added, viz. Messrs. Kyd and Storm.

Several communications were read on the subject of Lord W. Bentinck's suggestions as to introducing the large wheeled cart, and superior draft bullock.

The thanks of the meeting were ordered to be returned for them.

Read a letter from the Secretary to the Calcutta Trade Association, dated 11th April, intimating in reference to a petition drawn up by that body, and addressed to the House of Commons, having the same object in

view, viz. the equalization of duties on East and West Indian produce, and desiring to know whether the Agricultural Society would act in concert with the Trade Association in securing the services of a Parliamentary agent to watch and report upon the success of the several petitions, and to become jointly responsible for any expences incidental thereto.

The Secretary was directed to reply to the letter of the Trade Association, and to inform them that the Agricultural Society did not immediately perceive the necessity of employing an agent, having committed their own petition into the hands of gentlemen in whom they had great confidence.

Read two letters from Mr. W. R. Jones, dated Nauthpore, Poornea, 8th March, and 23d April, 1835, referring to a sample of coffee, which the Secretary assured the meeting he had found on trial to be excellent, and two small cakes of very fine Annoto, manufactured by Mr. Jones.

Read a letter from Mr. Vaupell, Secretary to the Agricultural and Horticultural Society of Bombay, acknowledging the receipt of several letters from Dr. Wallich, and intimating that a petition to Parliament in regard to the equalization of duties on East and West India produce, was then going through a Committee, and when adopted, would be consigned to the care of Lord Clare and Mr. Crawford.

Mr. Vaupell adverts to the opinion advanced by Dr. Wallich, on the subject of introducing an experimental establishment at Bombay, as a Nursery for Exotics, which the Society at that Presidency considered necessary for the furtherance of their plans towards the amelioration of Agriculture and Horticulture generally.

Read a letter from R. Lowther, Esq. to the Secretary, dated Benares, 13th April, on the subject of establishing a branch Society at Benares or Allahabad.

Read a letter from Mr. M'Dowall, dated Kissengunge, Rungpore, April 29th, forwarding to the Society some seed potatoes propagated by him from the actual seed.

Mr. M'Dowall had given much attention to the improvement of potatoes in that district, and had offered a reward for every potatoe apple brought to him by the ryuts, which he at length succeeded in procuring.

The potatoes were made over to Mr. J. W. Masters, who politely undertook to rear them, and to report upon the results.

Read an extract of a letter from Mr. H. Bonnevie, dated Rungpore, 3d

April, in reference to some Sea Island cotton seed received from the Society. The main obstacle which stood in the way of Mr. Bonnevie's success in introducing this cotton into the district, is stated in his letter to be the superstition entertained by the natives, "that ruin will come upon them and all their worldly property for cultivating any foreign produce."

Read a letter from Major Hearsey, to the Secretary, dated Kurkullee, 26th April, acknowledging receipt of grass and vegetable seed, and promising to give the Society the benefit of his experience in practical gardening, in a series of observations, which he intended to put together.

Major Hearsey draws attention to the vast improvement which has taken place in different branches of Horticulture, and is sanguine, that through the aid of the Society much benefit will be derived.

Read extract of a letter from W. Blundell, Esq. Commissioner on the Coasts of Martaban and Tenasserim, stating the want of success, which attended his endeavours to introduce the Sea Island cotton in those provinces from the seed being bad.

Mr. Blundell entertained great hopes that the produce of the Pernambuco seed, would thrive and become the staple commodity of the country, and speaks in high terms of the Candahar tobacco, of which some seeds had been sent to him, together with some wheat which was in course of trial at Tavoy.

Read extracts of several communications from Capt. Jenkins, of Gowahattee, dated severally, the 11th, 19th, 23d, 28th, and 30th April, and 4th May, including extracts of letters from Capt. Bogle and Mr. Hugon, to that gentleman, communicating some very interesting and important informations regarding the products and trade of the several provinces, wherein these gentlemen were located. These remarks were accompanied by samples, as follows:—

1. Samples of various sorts of Bootan wool and of thread spun from the same.
2. Samples of Moonga, and area silk in various stages.
3. Two chudders made of area pat.
4. Two pieces of Moonga silk.
5. Samples of wheat, safflower, and lint seeds grown by Capt. Jenkins in his own garden.
6. Indigo made from a broad leafed sort of Ruellia.
7. Indigo seed produced in Lower Assam.

Resolved, that special thanks be communicated to Captains Jenkins and Bogle, and to Mr. Hugon, for their most valuable communications.

Resolved, on the motion of Mr. Kyd, seconded by the Secretary, that the samples of silk and wool, be transmitted to the Society for the encouragement of arts, manufactures, and commerce in London, for their opinion; and that it be intimated that this Society feel extremely solicitous to enter into an active correspondence with them on matters connected with the objects of both institutions.

Capt. Jenkins in one of his letters, particularly recommends the publication of Dr. Hamilton's (late Buchanan's) Statistical Surveys, and the Secretary explained to the Meeting that while in England, he had consulted a number of competent persons, who had all agreed that it would be a most important desideratum to possess a record so valuable. Dr. Wallich had even gone the length of condensing the matter for publication, and read two letters from eminent publishers in London addressed to him on the subject, giving estimates of charges, &c.

Resolved, that the publication of Hamilton's Statistical Surveys is an object of great importance, and should be undertaken by the Society, if it can be accomplished without involving a greater expence than it would be prudent to sanction, considering the Society's limited means. That a reference be made to Mr. James Prinsep to ascertain the precise expence at which the Dinapore Survey was printed in the Asiatic Society's Journal, and the cause of the publication of the other Surveys being discontinued, requesting at the same time his opinion as to the best manner of resuming the Edition of the Work. Finally, that the Government be solicited to grant pecuniary aid towards accomplishing so important and useful an object, as the publication in question.

Resolved, that a Committee be nominated to consider and report upon the above matter, and also upon the best plan of establishing a Monthly or Quarterly publication to contain such papers and proceedings of the Society, as may be deemed of public interest. The Committee to consist of the Honourable Sir. E. Ryan, Baboo Radhakant Deb, Mr. Kyd, Baboo Ramkomul Sen, and the Secretary.

Read a letter from Mr. Trevor Plowden to the Secretary, dated 30th April, with a paper on the successful cultivation of the artichoke.

Mr. Bell explained to the meeting that he felt some difficulty in commencing his functions as the Society's Collector, in consequence of not

having yet received all the books and papers in the possession of the late Collector, Mr. Bagshaw. He had got charge of several of these, but there were still some wanting.

Resolved, that a letter be addressed to Mr. Bagshaw, requesting that he would have the goodness to transfer to Mr. Bell, as soon as he conveniently could, such of the said documents as may still remain with him.

Dr. Wallich having intimated that he wished to be relieved from his duties of Secretary to the Society, as he was now preparing for his approaching deputation to Assam, it was recommended by the President, that Mr. Bell should be requested to undertake those duties, and that gentleman having assented to this arrangement, it was

Resolved, That Mr. Bell be appointed officiating Secretary, during Dr. Wallich's absence, and that the office be accordingly transferred to him forthwith; that the thanks of the Society be offered to Mr. Bell for his kindness in undertaking those duties in addition to his charge as Collector.

The Secretary stated, that conformably to the Resolutions, he had invested 2,000 Rupees in Company's paper in addition to 5,000 Rupees already locked up.

Samples of Cotton and Coffee produced on Mr. Brown's Estate at Penang, were presented by Dr. Strong.

Also a superb collection of Specimens of Martaban and Tavoy wood sent by Mr. Blundell to Dr. Wallich at the request of the late Commissioner, Mr. Maingy.

Presented by the American Philosophical Society at Philadelphia (brought by Mr. Ryan,) 1st, 3d, 4th, and 5th Vols. of Memoirs of the Agricultural Society at Philadelphia, together with four Addresses delivered before the Society in 1832, also a Treatise on the use of Salt in agriculture as a manure, and finally the rules of their Society.

The four gentlemen proposed at the last meeting, were elected by ballot.

The following gentlemen were proposed, viz.

Farquhar Campbell, Esq.
Rustomjee Cŏwasjee, Esq.
Baboo Sree Kissen Singh.

The usual vote of thanks was then passed for the various contributions and donations.

Wednesday, June 10th, 1835.

A General Meeting was held this day.

Col. Dunlop, V. P. in the Chair.

Eighteen Members present.

The proceedings of the last meeting were read and confirmed.

Read the proceedings of a Sub-Committee, appointed by the Society at their General Meeting on the 8th April to consider and report upon certain suggestions offered by Lord William Bentinck in his Lordship's reply to the Society's address.

Read also the report drawn up by the Committee.

Resolved, that the special thanks of the Committee and the Society be returned to Dr. Wallich for his most valuable services in collecting information on the subject of their enquiries, and in drawing up the above report.

Read a letter from Mr. John Bell, dated 25th May, intimating his ready acceptance of the Society's invitation to act for Dr. Wallich during that gentleman's absence in Assam.

Mr. Bell laid upon the table a statement shewing that he had collected arrears of contributions since the 18th May last, to the extent of Sicca Rupees 1,754, and that the Society's assets now amounted to 7,500 Rupees in Company's paper, and upwards of 1,100 Rupees in cash.

Read a letter from Major W. M. Hodges, Private Secretary to the Governor of Madras, stating the earnest desire of Sir Frederick Adam to promote the interests of this Society; and that with reference to the circular of queries, forwarded to Madras by Dr. Wallich, His Excellency had issued directions to the various Collectors to contribute whatever information they could obtain, and that permission would be granted to any person deputed by this Society to search the records of the Madras Presidency.

Resolved, on the motion of Dr. Wallich, that the President, Sir E. Ryan, be requested to write a particular letter of thanks in acknowledgement of the obligation conferred on this Society by Sir Frederick Adam.

Read an extract of a letter from Mr. C. H. Blake, dated Dhoba, 16th May, offering to supply samples of sugar, if the Society would undertake to forward them to competent persons in England (other than brokers) for the benefit of their judgment as to quality, in order to remove

as far as possible, the prejudice that exists in Britain against East India sugar.

Read extract of a letter from Capt. C. M. Wade, Political Agent at Loodhiana, dated 23d May, to the address of Col. Dunlop, advising dispatch of some seeds from Cabul and Cashmere, and a Persian Manuscript on gardening.

Read a paper on the culture of the peach and plumb trees, by Lieut. Kirk, 14th Regt. N. I. dated Deyra Dhoon, 17th May.

Read a paper on pruning by Mr. J. W. Masters, which was forwarded to Mr. Piddington to aid him in his proposed publication.

Read a note from Mr. Willis to Col. Dunlop, relating to the books and papers in his possession upon the experiments carried on at Akra and expressing his fears that he would be unable to supply any remarks in time for this meeting. Mr. Bell laid upon the table a statement of what he had done in the Collector's department, viz.

Collected from members between the 18th May and 9th June, ...				1,754	0 0
Invested in Company's 4 per cent.	500	492	11 0		
Disbursed, ...		63	8 0		
				556	3 0
Cash Balance, ... Sa. Rs.				1,197	13 0

Three gentlemen proposed at the last meeting were duly elected by ballot.

Thanks were ordered to be returned for the several communications.

Wednesday, 8th July, 1835.

A General Meeting was held this day.

The Honourable Sir E. Ryan, President, in the Chair.

Sixteen members present.

The proceedings of the last meeting were read.

Read the copy of a letter written by the President to the Governor of Madras, on the subject of His Excellency's very polite communication referred to in the last proceedings.

Col. Dunlop presented a Persian Manuscript Work on gardening in the name of Captain Wade, Political Agent at Loodhiana.

Baboo Radhakanta Deb very kindly offered to give an abstract translation of its contents, and the book was lent to him for this purpose.

The Officiating Secretary laid upon the table some books and papers which were delivered to him by Mr. Willis on the preceding evening, and had been in the hands of the Committee appointed to draw up a report upon the experiments made at Akra.

Mr. Willis, who was present, explained the cause of not having yet drawn up a report.

With reference to instructions previously conveyed to the Officiating Secretary by the Committee to forward these papers, &c. to Mr. DeVerinne, late Superintendant of Akra, Dr. Wallich submitted to the chair the danger of sending such documents to a distance at this season without retaining duplicates, and as this precaution would involve considerable delay, stated that he was authorized to offer Mr. Bell's services to draw up a report at once, from the data before him, which was immediately agreed to.

Read a letter from Messrs. Willis and Earle to the Officiating Secretary, containing some interesting particulars of a small shipment of Akra grown cotton made by them at the request of the Society.

Mr. Willis having reported that some sample bales of cotton (duplicates of those above referred to) were still in his godowns—

Resolved, that these bales be forwarded to the Honourable Court of Directors with an official communication, and a copy of the Society's Report (when drawn up).

Mr. Patrick having tendered his services to work up a portion of the sample cotton into cloth and yarn—

Resolved, that one of the bales in Messrs. Willis and Earle's godowns be made over to Mr. Patrick, and that he be requested to forward the specimen to the Officiating Secretary, with his remarks on the quality of the raw material and texture of the cloth.

The President drew the attention of the meeting to the great importance of securing and distributing fresh supplies of cotton seed. From the trials already made, and results obtained, little doubt could be entertained of the success that would attend the introduction of a superior de-

scription of cotton. The efforts made by Messrs. Willis and Earle, to obtain supplies direct from America, having as yet failed, the President proposed, and it was unanimously

Resolved, That in addition to the funds of the Society in the hands of Messrs. Willis and Earle to meet the provision of seed ordered by them, a further sum of one thousand Rupees be set aside for the special purpose, and that the Officiating Secretary be directed to take such steps as seem to him best calculated to insure an immediate supply.

Resolved, On the motion of Mr. Kyd, that the Officiating Secretary be directed to indent for supplies of kitchen garden seeds from Bombay and Dinapore.

Some seeds, the produce of Sydney, were presented by Dr. Wallich in the name of C. K. Robison, Esq. Dr. Wallich had planted a portion of each, but without success, and Mr. Bell was requested to make a trial of what remained in his own garden.*

The following statement exhibiting the operations of the Collector's department was laid before the Meeting:—

Cash Balance on the 10th June, ...				1,197	13	0
Since collected, ...				722	15	9
				1,920	12	9
Invested in Company's 4 per cent. Sicca Rupees 500, ...	496	4	0			
Disbursed, ...	176	13	0			
				673	1	0
Balance, ...				1,247	11	9
Amount deposits in Company's paper,	8,000	0	0			
Interest thereon at Society's credit in the Govt. Saving's Bank on the 25th June,	157	9	2			
				8,157	9	2
Total Assets, Sa. Rs.				9,405	4	11

The Collector stated to the Meeting, that several members had de-

* From which nothing has been gained but a few plants of millet which have given good returns.

clined to pay up their arrears of subscription, while others would not reply to the calls made upon them.

Resolved, That with reference to the Rules of the Society, the Officiating Secretary do give in at the next meeting a list of non-paying members.

The following gentlemen were proposed as members:—Sir John Peter Grant; W. P. Grant, Esq.; R. Walker, Esq.

Wednesday, August 12th, 1835.

A General Meeting was held this day.

The Honourable Sir E. Ryan, President, in the Chair.

Fifteen members present.

The proceedings of the last Meeting were read and confirmed.

The President called the attention of the Meeting to a report which he held in his hand on the Society's experiments, which he had read, and believed, embraced every thing that was necessary.

The Report having been read from the Chair, it was moved by the President, and unanimously

Resolved, That the report be approved, and a copy sent to the Supreme Government as soon as Mr. Patrick shall have favoured the Society with his observations on the quality of yarn and cloth which he promised to have spun.

Resolved, That special thanks be returned to Mr. Bell for the trouble he has taken to draw up the report.

The following communications were read:—

1. Letter to the Officiating Secretary from C. R. Baynes, Esq. of Madras, announcing the formation at that Presidency of an Horticultural Society, annexing a copy of the resolutions passed on the occasion of a meeting convened for the purpose, and requesting a copy of the Society's Rules, &c.

The Officiating Secretary was directed to place himself in communication with Mr. Baynes, and to meet the wishes of the Madras Society in whatever way he might consider most acceptable.

2. A Series of letters from Captain Sage, Secretary to the Dinapore Branch Society; but as they had reference to a question in which the Society did not feel called upon to interfere, it was moved, and

Resolved, That the various official papers received from Captain Sage, be forthwith returned to that gentleman, with an intimation that the Society could not interfere in the matter.

3. A letter from Baboo Radhakant Deb, accompanied by an abstract translation of the Persian Manuscript delivered to him at last meeting, which the Baboo terms "An abridgement of the Agricultural and Horticultural work, compiled by Mohamed Fazil, under the direction of Captain Claude M. Wade."

The Officiating Secretary was directed to enquire as to the probable expence of having the whole accurately translated.

4. Two letters from Mr. Piddington, to the Officiating Secretary, dated 9th June and 3d July, urging members to contribute whatever they can, in aid of his work on gardening.

5. From Mr. Villet, of the Cape, dated 26th May, to Dr. Wallich, acknowledging receipt of an order for seed, and his intention to execute it.

6. A paper on grafting or budding, by Col. Presgrave, presented by Mr. Kyd, with a sketch of the process in its different stages, and a natural specimen.

7. From John Watson, Esq. of Moorshedabad, to the Secretary, acknowledging the receipt of some guinea grass seed, and suggesting the publication of a work, on the diseases of horned cattle in Bengal.

8. Extract of a letter from Captain Jenkins, of Gowahattee, to Dr. Wallich, dated 24th June, containing some useful observations on the breed of horned cattle best suited to Bengal, and recommending attention to the Carriage and Wheels used at Nagpore.

Captain Jenkins further asks the Society to procure the drawing of a machine used in the United States for separating coffee beans from the pulp.

Col. Dunlop drew a comparison between the soil and roads at Nagpore, and those in Bengal, expressing his opinion that this point had escaped the attention of Captain Jenkins, when he recommended the heavy iron wheel in use at Nagpore.

9. A letter from Captain Bogle, of Assam, to Captain Jenkins, conveyed in a letter to Dr. Wallich, giving a detailed list of articles imported and exported at Gowahattee, with some interesting particulars relating to the people.

Some discussion arose on the propriety of resuming the publication of

the Society's transactions, which had been discontinued partly owing to the low state of the funds, it was—

Resolved, That the Officiating Secretary, who tendered his services to conduct the publication of papers, under the direction of a Committee, if necessary, be requested to make a calculation of the probable expence of printing, and communicate the same at his earliest convenience.

(Presented to the Society.)

Proceedings of the Society of Arts. Adelphi, (New Series) received through Messrs. Thacker and Co.

The three last numbers of Bell's Comparative View of the External Commerce of Bengal, by the Author.

Three gentlemen proposed at the last meeting, were elected by ballot.

Charles Grant, Esq. Commissioner of the Soonderbunds, was proposed.

The usual vote of thanks was passed for all the foregoing communications.

The Officiating Secretary submitted a list of non-paying members.

Resolved, That the names given be withdrawn from the Society's books.

Wednesday, 9th September, 1835.

A General Meeting was held this day.

The Honourable Sir E. Ryan, President, in the Chair.

Fifteen members present.

The proceedings of the last meeting were read.

The Officiating Secretary laid on the table copies in duplicate of the Report upon experiments at Akra, read and approved at the last meeting, and now only waited the observations from Mr. Patrick on the cotton in its manufactured state.

Resolved, That a letter be addressed to Mr. Patrick, urging him to use his best endeavours, to get the matter speedily out of hand, and enable the Society to forward a copy of the whole to Government, and another to the Honourable the Court of Directors.

Read a letter from Baboo Hullodhur Law, to the Officiating Secretary offering to translate the compilation of Mohamed Fazil, with a specimen of his performance and terms.

Resolved, That some member of the Society conversant in Persian, be solicited to give a full abstract, and that Baboo Ramkomul Sen, be requested to afford the Society the aid of his intelligence.

Read a letter to the Officiating Secretary from Messrs. Ritchie, Stewart and Co. of Bombay, advising the shipment of some seeds per "Futtel Curreem" agreeably to an indent forwarded in July last.

Proposed by Mr. Kyd, and *Resolved*, That application be made to Madras for some seed potatoes to distribute to members and mallees.

The Officiating Secretary laid upon the table estimates from the various presses, in pursuance of a resolution passed in August, to elicit information as to the terms on which the Society's Transactions might be vigorously and permanently resumed.

Resolved, That the Transactions be printed at the Serampore Press.

Resolved, That the Honourable Mr. Melville, Mr. James Kyd, and Mr. John Bell, do form a Committee, for the examination and selection of papers for the press, and that they commence immediately.

On the motion of Mr. Bell, seconded by Mr. Kyd, and carried unanimously,

Resolved, That the present appears a fit opportunity for the Society to express their cordial thanks to Dr. Wallich for the valuable services which he has rendered as their Secretary since the resignation of Mr. Robison. It cannot be overlooked that Dr. Wallich's acceptance of office, just as an unpleasant correspondence had been agitated, bearing upon the terms on which the Society held a lease of the Alipore Garden, (then under abandonment) was productive of the most beneficial consequences, and that but for his exertions and address during the absence of the President at the Cape, the Society would in all probability have ceased to exist.

The best proof of what has been effected, was the regular train in which every thing had been left by Dr. Wallich to his successor for the time being, while it reflected the highest credit on his ability and disinterested zeal.

Although the Society have reason to regret the temporary absence of so valuable a member as Dr. Wallich, during his mission to Assam, yet

the important results likely to accrue to the agricultural and commercial interests of India from his scientific observations, will, in some measure, make amends for the loss of his services, and it is hardly necessary to add, that in proportion to the regret now felt at his departure, will the Society hail, with pleasure, his return.

The Collector submitted the following statement of what had been done for the last two months:—

Amount collected from 7th July to 29th August, ...				1,371	6 0
Invested in 4 per cent. Govt. paper, ...	1,024	3	10		
Disbursed, ...	152	14	0		
				1,177	1 10
Balance carried to Bank Account Current, Sa. Rs.				194	10 2

Charles Grant, Esq. proposed at last Meeting, was duly elected by ballot.

The following gentlemen were proposed:—

Geo. John Siddons, Esq. Officiating Post Master General.

W. H. S. Rainey, Esq. of Jessore.

Wednesday, October 14th, 1835.

At a General Meeting held this day.

The Honourable Sir E. Ryan, President, in the Chair.

The proceedings of the last meeting having been read and confirmed, the Officiating Secretary informed the meeting that he had received, and distributed to members and mallees, about two-thirds of the Cape seed sent by Mr. Villet, which had been found on trial most excellent.

Resolved, That the surplus be advertised for sale in original parcels, and that the price be fixed at 10 Rupees.

Mr. Bell announced the receipt (per Futtel Curreem from Bombay) of onion, carrot, and brinjal seeds, and that they were now in course of distribution, likewise of some seed potatoes from Madras, obligingly sent round by A. P. Onslow, Esq. Secretary to the Horticultural Society recently established at that Presidency.

Also the expectation of immediate supplies of bean, pea, and turnip seed, commissioned by him from Patna, which ought to have arrived long ago, but Capt. Sage having failed in his promise of compliance with the Society's request, the Officiating Secretary had applied to Mr. J. Duhan, of Dinapore, who had undertaken to execute the order forthwith.

The vegetable and cotton seed ordered by Dr. Wallich from Grant Thorborn, of New York, not having arrived, the Officiating Secretary suggested, and it was

Resolved, That a correspondence be at once opened with respectable agents at the Cape, North America, Van Dieman's Land, and wherever seeds of a superior quality can be procured; and Mr. Bell was requested to make such arrangements as would in future prevent disappointment.

It was remarked by a member that the gardens of private gentlemen were frequently robbed in the night previous to the exhibition of vegetables at the Town Hall, and Dr. Marshman stating his belief that many of those exhibited as the produce of gardens about Calcutta, were really brought from the vicinity of Chandernagore, the President suggested that a Committee be formed to visit occasionally the grounds cultivated by mallees for the market, and three gentlemen volunteered their services for this office, viz. Dr. Strong, Mr. Kyd, and Mr. J. W. Masters. It was further proposed, that Mr. J. Masters should be solicited to add his name to the Committee.

Sir John Peter Grant proposed, and it was

Resolved, that the head mallees of gentlemen's private gardens be permitted to compete for prizes (in their own names) at the next exhibition.

The following communications were read:—

No. 1. From Mr. Patrick of Fort Gloucester, to the Officiating Secretary reporting most favourably on the sample bale of Akra grown cotton, which had been manufactured into twist and cloth for the purpose of being forwarded to the Honourable the Court of Directors.

No. 2. From Mr. Blundell, Commissioner at Moulmein, to the address of Mr. Patrick, stating that the Pernambuco cotton seed sent to him by that gentleman, had not vegetated.

Mr. Blundell is strongly impressed with a belief that the Sea Island cotton will thrive there, and asks for a supply.

No. 3. Extract of a letter from Capt. Dixon, Political Agent to the Governor General at Mhairwarrah, to C. E. Trevelyan, Esq. on the subject of American maize.*

With reference to the favourable report communicated by Capt. Dixon, the Officiating Secretary intimated to the meeting that he had requested Mr. J. J. Dixwell, supercargo of the American ship *Fortitude*, to bring with him, next voyage, two barrels of American maize of sorts, in the husk, which that gentleman had politely promised to do, and further, that he had offered his services on behalf of the Society in any way they might be available.

No. 4. From Capt. Low of Penang, to the address of the Secretary, forwarding the prospectus of a work, which he contemplated publishing on the soil, climate, and cultivation of Prince of Wales' Island, and soliciting patronage.

Resolved, That the Society do encourage Capt. Low, by subscribing for 10 copies of his pamphlet.

No. 5. From Mr. J. W. Masters, head gardener at the Botanical gardens, forwarding a box of Cabool seeds of sorts, received from the Secretary to the Asiatic Society.

Resolved, That Mr. Masters be requested to give the seeds a trial in the Botanical gardens.

No. 6. From Baboo Ramkomul Sen to the Officiating Secretary, giving an English Index of the contents of a Persian Manuscript on gardening.

No. 7. From Capt. Ouseley, presenting some American tobacco seed.

No. 8. From W. Lambert, Esq. of Allahabad, with a paper on the management of peach trees and sweet briar.

No. 9. Darwin's Pyhtologia, and Dixon on Agriculture, presented to the Society by the Officiating Secretary.

G. J. Siddons, Esq. and W. H. S. Rainey, Esq. were duly elected members by ballot.

The following gentlemen were proposed:—

His Excellency Sir H. Fane, Commander-in-Chief, G. C. B.

Charles Hay Cameron, Esq.

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* This interesting communication has been printed in the 2d volume of the Transactions.

Capt. W. Bell, Superintendent of Public Works.
A. D. Coull, Esq.
W. Stevenson, Esq. Jun. M. D. Lucknow.
D. MacPherson, Esq.
C. Teimroth, Esq. Serampore.
A. Grant, Esq.
James Cock, Esq.

The following statement was laid on the table by the Collector:—

Amount collected from 30th August, to 12th October, ...			907	2 6
Disbursed for seeds	669	6 9		
Establishment and sundry expences	195	13 6		
			865	4 3
Balance carried to Bank Account,			41	14 3

Thanks were ordered to be returned for the various communications.

Wednesday, November 11*th*, 1835.

A General Meeting was held this day.

Col. Dunlop, V. P. in the Chair.

Ten members present.

The proceedings of the last meeting were confirmed.

The following communications were then read:—

No. 1. From J. P. Grant, Esq. Deputy Secretary to the Governor of Bengal, acknowledging receipt of the Society's report upon Akra, in duplicate, and intimating that one copy would be forwarded to the Honourable Court of Directors by the ship *True Briton*.

No. 2. From Messrs. Willis and Earle, to the Officiating Secretary, dated the 17th October, advising the shipment per *Bussorah Merchant*, of some sample bales of Akra grown cotton, and of twist and cloth spun from a portion of the same.

No. 3. Copy of a letter from the Officiating Secretary to Peter Auber, Esq. forwarding Bill of Lading and Invoice of the samples alluded to by Messrs. Willis and Earle, for the information of the Honourable the Court of Directors.

No. 4. From Raja Kaleekissen Bahadoor, presenting a specimen of a fruit, with a descriptive memorandum.

No. 5. From Mr. Villet, of the Cape, dated 12th September, to the address of Dr. Wallich, presenting to the Society some bucca plants brought on the *Bland*.

The Officiating Secretary was directed to make them over to the head gardener of the Botanical garden.

No. 6. From Mr. J. J. Dixwell, to the Secretary, presenting a box of American maize for distribution.

No. 7. From Mr. Halhed, C. S. presenting plants of the horse-raddish, Hottentot fig, and moss-rose, brought by that gentleman from the Cape, which were ordered to be made over to Mr. Masters for propagation in the Botanical garden.

No. 8. From Mr. W. H. S. Rainey, presenting a bottle of Sandoway tobacco seed.

No. 9. From Mr. T. A. Shaw, Rungpore, presenting a parcel of turnip seed produced at Buxadawar.

No. 10. From Mr. G. F. Hodgkinson, presenting a cannister of madder seed received from Smyrna, via England, with directions for its culture.

No. 11. From Mr. Piddington, presenting a small parcel of Bourbon cotton seed.

No. 12. From Mr. C. K. Robison, with plan and description of a continuous Still, invented by him.

No. 13. Specimens of very fine West India ginger and turmeric, presented by Mr. Kyd.

Resolved, That these specimens be retained in the Society's room for comparison with the indigenous samples.

Mr. Kyd called the attention of the meeting to the vast importance of securing by every possible means, abundant supplies of cotton seed, contrasting the small extent of cultivation necessary for the production of sugar, with the unbounded demand for the material which is now required for the whole world. Mr. Palmer had very kindly offered his services to procure supplies of cotton seed for the Society; and in addition to the orders already sent, Mr. Kyd proposed, and it was

Resolved, That a further sum of 500 Rupees be set aside for this purpose, and that the Officiating Secretary be requested to accept Mr. Palmer's obliging offer.

Mr. Kyd further brought to the notice of the meeting, the heavy charge of duty made at Madras on Cape seed landed and reshipped at the port on their way to Calcutta, and after pointing out the consideration and liberality that the Society had at all times experienced from Government, proposed, and it was

Resolved, That the Officiating Secretary address himself to Government, soliciting a repeal of duties on all seeds imported either here or at the Sister Presidencies on account of the Agricultural Society.

Mr. Bell offered a similar suggestion in regard to the transmission of the Society's Transactions now publishing in rapid succession, which must tend more than any thing else to keep up that degree of active interest, which has lately been felt. The last Resolution embraced the concurrence of the meeting on this point, and it was accordingly embodied.

No. 14. From Baboo Ruggonath Bose to the Officiating Secretary, declining to pay up his arrears of subscription unless provided with certain supplies of seed, and requesting that his letter be laid before the meeting.

The Officiating Secretary explained to the meeting, that the Baboo had been supplied in common with other members, with seeds from the Cape, Madras, and Bombay, and after reading the Officiating Secretary's reply, it was

Resolved, That the name of Ruggonath Bose be withdrawn from the list of members, unless he shall have paid up his arrears of contribution before the December meeting, and that he forthwith be apprized of the Society's resolution.

No. 15. Moved by Mr. Kyd, and seconded generally, that in order to maintain a check upon mallees imposing upon the Society by a show of vegetables purporting to be the produce of certain gardens of their own, in the vicinity of Calcutta, which have really been brought from a great distance; and with reference to the impracticability of those gentlemen who had kindly undertaken to visit the garden grounds occasionally, fulfilling their design with due effect, the Clerk of the Society be directed to make himself acquainted with the various gardens, and the names of their respective occupants, noting the general appearance of the vegetables from time to time, and the particular sorts in the cultivation of which they severally seem to excel.

Resolved, That Mr. Turnbull be authorized to draw an additional allowance of 30 Rupees per mensem, from the 15th November, 1835, to the

28th February, 1836, which may then be continued or not as the gentlemen composing the Committee may think proper.

A memorandum of the Cape seed sold on account of the Society was laid on the table.

The Officiating Secretary brought to the recollection of the meeting, the circumstance of a sum still in the hands of Messrs. Willis and Earle, which had been made over to them for the provision of cotton seed from America.

Resolved, That the Officiating Secretary be requested to write to Messrs. Willis and Earle for some specific information as to the probable fulfilment of the order, and if not expected soon, that they be asked to return part or the whole of the advance to be at the disposal of the Society for similar purposes.

His Excellency the Commander-in-Chief and eight more gentlemen proposed at last meeting, were duly elected by ballot.

The following gentlemen were proposed:—Captain W. Speirs of Rangoon, Messrs. J. C. Wilson, D. B. Syers, John Allan, and Baboo Moteelall Seel.

The usual vote of thanks was passed for the several communications and contributions above enumerated.

Statement from the Collector.

Amount collected from 13th Oct. to 17th Nov. 1835,	381	0	0
Proceeds of Cape Seeds sold, ...	320	0	0
	701	0	0
Disbursed, ...	243	3	0
Balance to Bank Account, ... Sa. Rs.	457	13	0

Wednesday, December 9th, 1835.

A General Meeting was held this day.

Col. Dunlop, V. P. in the Chair.

Twelve members present.

The proceedings of the last meeting were read.

The Officiating Secretary intimated having received from the press, the greater number of copies of the Society's report upon Akra, which he had distributed to resident members, and only waited a reply from Government to forward others to members in the Mofussil.

The following communications were read:—

1. From His Excellency the Commander-in-Chief acknowledging his election.

2. 3. Letters from the Secretary to the Government of Bengal and Civil Auditor on the subject of the Society's bills for monthly allowance from Government.

4. From C. K. Robison, Esq. with enclosures from W. Cracroft, Esq. forwarding some vegetable seeds from Sydney for the use of the Society.

5. From Messrs. Willis and Earle, dated 17th November, stating the utter hopelessness of longer expecting cotton seed to their order from America, and returning the sum originally paid to them by the Society to meet such investment.

6. From Grant Thorburn, of Hallet's Cove, Long Island, New York, dated 1st June, to the address of Dr. Wallich, acknowledging receipt of that gentleman's order for cotton and vegetable seed, and promising to give it his attention.

7. From Mr. J. W. Masters, presenting in the name of Dr. Wallich, the 3d Annual Report of the Royal Horticultural Society of Cornwall.

8. From Captain A. Bogle to the Officiating Secretary, dated Assam, November 17th, requesting information on the culture of country products, especially sugar-cane, cotton, oil seeds, and as to the general management of the silk-worm, &c.

The Officiating Secretary had, on receipt of Captain Bogle's letter, sent the several numbers of the Society's Transactions already printed, including their report upon experiments at Akra, with a copy of his own pamphlet, on the growth and manufacture of sugar, &c. in the West Indies.

9. Extract of a letter from J. C. Marshman, Esq. to the Officiating Secretary, dated 28th November, drawing attention to the opposite deductions given by different gentlemen on the comparative advantages of the Saw Gin and Native Churkee.

10. From W. C. Hurry, Esq. asking for a loan of the Saw Gin in the Society's room.

11. From C. Crane, Esq. presenting the seed of the ground Rattan, gathered in July last, at the straits. The Malays entertain very extravagant notions about the interval of seeding, some not hesitating to declare that it yields only once in a thousand years.

That now laid before the meeting was the first seen within the recollection of the oldest inhabitant.

12. From Mr. Bell, a yam of unusual size, brought from Penang, and the head of a large sort of grain produced in his garden from seed, received from Van Dieman's Land through C. K. Robison, Esq. in July last.*

13. From Col. Dunlop, presenting a variety of grain, fruit, and other seed, the produce of Cashmere received from Captain Wade, Political Agent in Loodhiana.

Resolved, That these seeds be made over to Mr. J. W. Masters at the Botanical Garden, reserving a portion for His Excellency the Commander-in-Chief, the Honourable W. H. L. Melville, and any other members who might wish to try them.

14. From John Palmer, Esq. to the Officiating Secretary, promising to procure from America, some cotton seed, &c.

15. From Mr. J. W. Masters, enclosing copy of a letter from Sir Robert Colquhoun, to the address of Dr. Wallich, on the subject of the Society's Petition to Parliament for the equalization of duties on East and West India sugar, &c.

16. From Mr. J. Duhan, of Dinapore, dated 13th October, enclosing a memorandum of three cases of seed ordered by the Officiating Secretary on account of the Horticultural Society of Madras.

17. From C. K. Robison, Esq. dated 7th December, forwarding a plan of his continuous still. Mr. Robison's former explanatory letter on the subject was read, and it was ordered to be laid on the table for the information of any member, who might wish to study the principles on which it has been constructed.

18. A further supply of American maize was presented by the Officiating Secretary in the name of Mr. J. J. Dixwell.

The Collector laid upon the table, the following memorandum of what had been effected in his department.

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* Supposed to be a species of millet.

Amount collected from members from the 9th Nov. to the 7th Dec. 1835, ...	572	0	0			
Ditto from Govt. seven months arrears of allowance, at 130 Rupees per month,	910	0	0			
Ditto from Messrs. Willis and Earle, being the amount paid to them in 1833 for the provision of cotton ordered from America, and not forthcoming, ...	1,000	0	0			
Ditto for seeds sold, ...	60	0	0			
				2,542	0	0
Invested in 2d. Five per cent. Govt. paper,	1,546	7	3			
Disbursements, ...	496	11	9			
				2,043	3	0
Balance carried to Bank Account, ... Sa. Rs.				498	13	0

Messrs. J. C. Wilson and D. B. Syers and Captain Speirs proposed at last meeting, were duly elected members by ballot.

John Allan, Esq. and Baboo Motteelall Seel were re-elected.

The following gentlemen were proposed: Captain A. Bogle, of Assam, and James Pontet, Esq.

Thanks were ordered to be returned for the various communications, &c.

Distribution of Medals and Pecuniary Rewards among Market Mallees, at the exhibition in the Town Hall, the 22d January, 1835.

Names of Mallees.	*Place of Cultivation.*	*Medals.*	*Pecuniary Rewards.*
CABBAGE.			*Rs. A. P.*
Bursatulla, ...	Allipore, ...	1	
Golaul, ...	Doorgapore, ...		16 0 0
Muthoor, ...	Moocheekhola, ...		16 0 0
DRUMHEAD CABBAGE.			
Lukkoo, ...	Moocheekhola, ...		5 0 0
CAULIFLOWER.			
Hullodhur, ...	Moocheekhola, ...	1	10 0 0
Gobindo, ...	Ditto, ...		10 0 0
Ramchund Doss, ...	Jharullee, ...		5 0 0
SALAD.			
Nurrohurree, ...	Saum Bazar, ...		5 0 0
Narain Ghose, ...	Ditto, ...		5 0 0
SPINAGE.			
Bheem, ...	Sonae, ...		2 0 0
POTATOES.			
Beenud, ...	Jharulea, ...		10 0 0
Gopynath, ...	Salleepore, ...		10 0 0
Ramnarain, ...	Bhaugpore, ...		10 0 0
Nubbee, ...	Sealda, ...		8 0 0
Teencurree, ...	Singarhutty, ...		8 0 0
Sumbhoo, ...	Moocheekhola, ...		8 0 0
CARROT.			
Ramjeeram Doss, ...	Ettalghutta, ...		8 0 0
RED BEET.			
Hurro Doss, ...	Moocheekhola, ...		8 0 0
Punchoo, ...	Baelpooker, ...		10 0 0
Ramchund, ...	Singarhutty, ...		10 0 0
Purran, ...	Baelpooker, ...		10 0 0
KNOLE COLE.			
Gooroochurn Doss, ...	Moocheekhola, ...		10 0 0
Premnarain, ...	Ditto, ...		8 0 0
TURNIP.			
Gungaram, ...	Balgachy, ...		4 0 0
RADISH.			
Ramchund, ...	Moocheekhola, ...		4 0 0
FRENCH BEANS.			
Joynarain, ...	Moocheekhola, ...		3 0 0

Names of Mallees.	*Place of Cultivation.*	*Medals.*	*Pecuniary Rewards.*
			Rs. A. P.
BRINJAL or BAIGOON. ROUND.			
Ramchunder, ...	Jharullee, ...		4 0 0
Ramchunder, ...	Entally, ...		4 0 0
DITTO LONG.			
Obhoychurn, ...	Koollea, ...		4 0 0
SOOSNEE ALLOO (or a small sort of YAM.)			
Goopeenath Soor, ...	Saumbazar, ...		4 0 0
LOVE APPLE.			
Bungshee, ...	Saumbazar, ...		2 0 0
PATNA BAER.			
Mutthoor, ...	Sheety, ...		4 0 0
Kooncheel Doss, ...	Saumbazar, ...		4 0 0
Muckhun (old woman), ...	Chitpore, ...		1 0 0
PEAS.			
Nucheem, ...	Baltemgree, ...	1	10 0 0
Surroop, ...	Goburdunga, ...		10 0 0
Sheeboo, ...	Sheetee, ...		10 0 0
GUAVA.			
Luckhun Sing, ...	Entally, ...		4 0 0
Kanghye Mundul, ...	Ditto, ...		4 0 0

The show of vegetables on this occasion was fair, considering the disadvantages under which the Mallees have laboured, owing to the unusual duration of the past rainy season, and the consequent lateness and backwardness of the cold weather.

There were distributed 3 silver medals and 268 Rupees cash.

(Signed) N. WALLICH, M. D.

Secretary.

Town Hall, 22d January, 1835.

Distribution of Medals and Pecuniary Rewards among Market Mallees, at the exhibition in the Town Hall, on Thursday, the 12th February, 1835, at 10 o'clock in the morning.

Names of Mallees.	*Place of Cultivation.*	*Medals.*	*Pecuniary Rewards.*
			Rs. A. P.
DRUMHEAD CABBAGE.			
Ramnarain Doss, ...	Jharulea, ...		5 0 0
CAULIFLOWER.			
Joynarain Ghose, ...	Moocheekhola, ...		5 0 0
Ramhurry, ...	Ditto, ...		3 0 0
POTATOES.			
Heemtollah, ...	Moocheekhola, ...		5 0 0
Sumbhoo Mallee, ...	Allipore, ...		3 0 0
Sumbhoo Nath, ...			3 0 0
Kassinath, ...	Sealdah, ...		3 0 0
BLACK RADISH.			
Moocheeram, ...	Sonae, ...		2 0 0
SPINAGE.			
Ramchund Doss, ...	Jharullea, ...		2 0 0
CARROT.			
Tarachund, ...	Saumbazar, ...		2 0 0
TURNIP.			
Hullodhur Doss, ...	Moocheekhola, ...		2 0 0
FRENCH BEANS.			
Cheeroo Ghose, ...	Moocheekhola, ...		5 0 0
BRINJAL.			
Beendabun, ...	Moocheekhola, ...	1	
Gooroochurn, ...	Baullea, ...		2 0 0
YAM.			
Ram, ...			2 0 0
PATNA BAER.			
Rutten Bisses, ...	Sheety, ...	1	
Muthoor Doss, ...	Ditto, ...		3 0 0
Juggernath, ...	Dum Dum, ...		3 0 0
PEAS.			
Jadub, ...	Belgachee, ...		3 0 0
GOURD (LAO.)			
Bungshee, ...	Singharhutty, ...		5 0 0
PUMKIN, (KOOMRA.)			
Ramnarain, ...	Baugpoora, ...		3 0 0
MELON PUMKIN (SOPOORA KOORMA.)			
Goluck, ...	Singharhutty, ...		3 0 0

Names of Mallees.	*Place of Cultivation.*	*Medals.*	*Pecuniary Rewards.*
KURRELLA.			
Goopeenath, ...	Saumbazar, ...		2 0 0
LARGE FINGERED CITRON.			
Roopchund, ...	Sawpore, ...	1	
MOOKEE KOCHOO.			
Gobind, ...	Singharhutty, ...		4 0 0
BETRAJ OR CHINA ALLOES (DELICHOS BULBOSUS.)			
Essop, ...	Moocheekhola, ...		5 0 0
Bissonath, ...	Maddoolee, ...		3 0 0
Sandel (woman), ...	Machooa Bazar, ...		1 0 0
SUKKERKUND ALOO.			
Ramhurry Doss, ...	Simla, ...	1	
MAUNKOCHOO.			
Beenud, ...	Jharullea, ...	1	
KACHKOLLA (BONONEE.)			
Hullodhur, ...	Moocheekhola, ...		3 0 0
ONION.			
Mothoor, ...	Saum Bazar, ...		3 0 0
WEST INDIA SORREL.			
Rajoo Mully, ...	Saum Bazar, ...		1 0 0
ARTICHOKE.			
Hullodhur Doss, ...	Moocheekhola, ...		5 0 0
DOODYA SHIM (BEAN.)			
Cheroo Ghose, ...	Moocheekhola, ...		
PALUNG SAUG.			
Soobul, ...	Baelpooker, ...		3 0 0
LAUL SAUG.			
Hamud Ollah, ...	Moocheekhola, ...		2 0 0
KASARI SAUG (LATHYRIN SATINUS.)			
Muddoo Soodun, ...	Goopeenath Baboo's Bazar, ...		2 0 0
SUGAR LOAF CABBAGE.			
Ramchund Doss, ...	Jharullea, ...		3 0 0
Hullodhur Doss, ...	Moocheekhola, ...		3 0 0
WATER CRESS.			
Gobindchurn Doss, ...	Saum Bazar, ...		5 0 0
LOVE APPLE.			
Sunker, ...	Saum Bazar, ...		3 0 0
Ramnarain Naukey, ...			2 0 0
GUAVA.			
Hullodhur, ...	Moocheekhola, ...		3 0 0

Names of Mallees.	*Place of Cultivation.*	*Medals.*	*Pecuniary Rewards.*
			Rs. A. P.
PINE APPLE.			
Mothoor Ghose, ...	Utterpore, ...		5 0 0
COCOANUT.			
Ramchund Doss, ...	Jharullea, ...		5 0 0
PAPEA.			
Mothoor Chunder Ghose,	Saum Bazar, ...		3 0 0
SUGAR CANE.			
Hullodhur, ...	Moocheekhola, ...	1	
CHALTA (ALLENIC SPECIOREE.)			
Beerjo Mohun, ...	Chitpore, ...		2 0 0
LUNKA (LONG COPSI CANSEOSEE.)			
Degumbur, ...	Gubra, ...		4 0 0

After the above principal distribution had taken place, an additional sum of 34 Rupees was distributed, in small rewards of 1 or 2 Rupees each, among a number of Mallees who had brought the second best articles.

Memorandum.

The Right Honourable Lady William Bentinck honoured the exhibition by presiding and distributing the medals. Upon the whole, the show of Vegetables and Fruits was very handsome, although some articles had been brought not strictly belonging to those sold at the Native Bazars, and on the other hand several articles particularly belonging to the class were missing altogether.

Eight silver medals, and 170 Rupees were distributed on this occasion.

(Signed) N. WALLICH, M. D. *Secretary.*

Regulations for the Agricultural and Horticultural Society of India, as sanctioned at a General Meeting, 11th March, 1835.

ARTICLE 1. The promotion and improvement of the Agriculture and Horticulture of India constitute the objects of the Society.

2. Gentlemen of every nation shall be eligible as Members of the Society.

3. Candidates for admission as Ordinary Members shall be proposed by two members, at a general meeting, and ballotted for at the succeeding, when a majority of votes will determine the election.

4. Honorary Members shall be persons eminent for their knowledge of, or encouragement given, to Agriculture or Horticulture; or for services rendered to the Society. They are to be proposed and ballotted for as Ordinary Members; but two-thirds of the votes are to determine their election.

5. Ordinary Members are to pay an admission fee of Eight Rupees, and the same sum quarterly, in advance, so long as they continue resident within the Presidencies of Bengal or Agra. It shall be optional for any member to compound for the quarterly contributions by the payment of 150 Rupees to the funds of the Society.

6. Resident Members failing to pay their contributions for one year the same having been duly demanded, shall cease to be Members of the Society, and their names shall be erased from its list.

7. The Office-bearers shall be elected annually, consisting of

1 President;
4 Vice-Presidents, two of whom shall always be Natives;
2 Secretaries, one European and the other Native;
1 Collector.

8. A General Committee shall also be elected annually, consisting of the Office-bearers and six Members.

9. General Meetings shall be held at the Society's Apartments in the Town Hall, on the second Wednesday of every month, throughout the year.

10. The election of Office-bearers shall take place at the Anniversary Meeting in January.

11. Special Meetings may be convened at any time, on a requisition to that effect, signed by at least six members.

12. The Bank of Bengal shall be the Treasurers of the Society; and any surplus in their hand of 500 Rupees, (over and above what may be required for current expences,) shall be invested in Company's securities, on behalf of the Society, in the joint names of the Secretaries and Collector for the time being.

13. Such communications made to the Society, as may be deemed of public utility by the Committee, shall be published, whenever a sufficient number have been collected to form part at least of a volume.

REPORT

OF THE

AGRICULTURAL AND HORTICULTURAL SOCIETY OF INDIA,

ON

CERTAIN EXPERIMENTS MADE AT AKRA

IN

THE GROWTH OF

FOREIGN COTTON, SUGAR CANE, AND TOBACCO.

WITH APPENDIX.

FROM THE SERAMPORE PRESS.
1835.

MEMORANDUM.

At a General Meeting of the Agricultural and Horticultural Society of India held at the Town Hall, on Wednesday, the 9th September, 1835.

RESOLVED—"That a Committee be formed consisting of the Honourable W. H. L. Melville, Mr. James Kyd, and Mr. John Bell, to classify papers and carry on the publication of the Society's Transactions."

N. B.—In accordance with this Resolution, all papers, in continuation of Vol. II. Part I. are now going through the Committee and will appear in due course. In the mean time it has been considered proper to give publicity to the Report on Experiments made at Akra, as a subject of such vital importance cannot be too soon made known.

In committing to the Press the following Report, the Committee of Papers of the Agricultural and Horticultural Society deem it proper to notice the state of confusion into which, owing to the absence of the President and other causes, the Records of the Society have fallen. They are apprehensive that many valuable contributions, shewing the results of the experiments made by individuals with the cotton, tobacco, and other seeds furnished to them by the Society, have been mislaid. They venture therefore to express a hope, that any Gentlemen who may have favoured the Society with communications on these subjects will, bearing in mind the unfortunate combination of circumstances which threatened the very existence of the Society, excuse any apparent neglect of their contributions, and be pleased to transmit copies of them to the present Secretary, Mr. John Bell, if after all arrears have been printed, they do not find that their papers constitute a part.

REPORT of a Special Sub-Committee, upon certain Experiments made at Akra in the Cultivation of Cotton, Tobacco and Sugar Cane, read at a General Meeting on the 12th August, 1835, and adopted by Resolution, as the "Report of the Agricultural and Horticultural Society of India."

REPORT.

In pursuance of a Resolution passed at a Meeting of the Society in July, 1833, and with special reference to a more recent Resolution of the 11th March last, your Committee now beg to offer such observations on the Agricultural experiments made at Akra, as they trust will be satisfactory to the Society at large, and at the same time enable them to render to Government some account of their proceedings, and of the measures adopted under the direction of the several Members of the Agricultural Committee, at the experimental farm of Akra.

Before entering fully upon the operations which were carried on, your Committee have deemed it expedient to revert to the original correspondence with Government, which led to the establishment of the farm in question.

The attention of the Society having been absorbed for two years (from May, 1827, to April, 1829,) in endeavouring to introduce European fruit trees, and other exotic plants, to the almost entire annihilation of the general fund, measures were taken to reduce the expenditure.

It was at the same time considered that the efforts and resources of the Society would be more legitimately employed towards the encouragement of those great staples that have contributed essentially to raise America to the proud station she now maintains in the scale of Commercial nations, and to swell the West India interest to such a degree of powerful influence, as seriously to interfere with any thing approaching to successful competition in this country.

The agitation of this question arrested the attention of the local Government, and drew forth a letter from Mr. Molony, Deputy Secretary in the General Department, under date the 20th October, 1829, expressive of the Governor General's de-

sire to co-operate in such measures and arrangements as might appear to the Society best calculated to promote the cultivation of Cotton and Tobacco of a superior description, as well as to improve the quality of other articles of raw produce: intimating at the same time that it was not the intention of Government to interfere in any manner with the proceedings of the Society.

In reply to this invitation,* the Society briefly noticed the amelioration that had been effected in Horticulture, by importing and distributing to Native gardeners a variety of seeds, and by giving small premiums to the most successful.

Grounding their views on these results, they recommended to Government the adoption of a similar course in respect to Agricultural staples, upon such a scale of liberality as would tempt the application of intelligence to the objects in contemplation; and they suggested that the sum of 20,000 Rupees should be placed at the disposal of the Society for this purpose, and that a further annual grant might be allowed to enable them to distribute smaller premiums.

Government in answer to this communication consented to the grant of 20,000 Rupees for premiums, on a scale of distribution proposed by the Society in their letter to Mr. Secretary Holt Mackenzie of the 21st April, 1830; and further accorded the annual sum of 10,000 Rupees for the purpose of establishing an experimental farm, (exclusive of rent,) and 4,500 Rupees more for buildings and necessary stock for the first year.

These preliminaries adjusted, the attention of the Society was next directed to the selection of a parcel of ground of sufficient dimensions, and so situated as to ensure the vigilant superintendence of such members as might be appointed to conduct the experiments.

To effect this was a matter of difficulty, owing to the numerous petty allotments into which zemindaries are divided round about Calcutta.

After much negotiation and vexatious delay, the impossibility of obtaining an unexceptionable piece of ground of sufficient extent was nearly determining the Society to give up enquiry as hopeless; when a proposal was made by Mr. Myers to let 500 beegahs of ground at Akra to the Society, at an annual rent of 3 Rupees 8 annas per beegah.

This offer was referred to the Committee; and on the 18th of

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* Vide Mr. Secretary C. K. Robison's letter to Mr. Molony, dated 25th November, 1829, published in 1st Number of Vol. II. of the Society's Transactions.

September, 1830, Mr. Myers conducted several members round the estate to pronounce upon its applicability.

The situation being convenient, it was deemed advisable that the Society should possess the dwelling-house as well as land, and Mr. Myers accepted an offer then made of 3,000 Rupees a year for the premises.

The President (Sir E. Ryan) next suggested, and it was resolved, that a Sub-Committee be chosen from the Members of the Agricultural Committee, for the purpose of carrying on experiments, and ten were chosen, two of whom were to visit the farm twice a week, and keep an exact account of their directions, &c.

The next point which engaged the attention of the Society, was the selection of a steady and intelligent person to superintend the experiments, and carry the orders of the Sub-Committee into effect.

An advertisement was proposed as the most effectual means of securing a choice; and during this interval the Sub-Committee were employed in preparing a prospectus of the mode in which they proposed to manage the plantation, and an estimate of the probable expenditure, method of checking accounts, &c.

The advertisement brought forward *forty-seven* candidates, whose names were noted by the Sub-Committee; and, after a careful investigation of their several merits and qualifications, the selection devolved upon four, who were accordingly put in nomination, and the choice fell on Mr. J. M. DeVerinne, who was appointed on the 14th November, 1830, and directed to draw up a plan of proceedings agreeable to suggestions submitted by the various members, for the management of the farm.

It may be proper to mention the recommendations which guided the Sub-Committee in their selection.

Mr. DeVerinne had the advantage of a respectable education in England, and had been for several years in the management of Indigo works, which he carried on on his own account. Being burdened with an unprofitable concern, coupled with the failure of his agents Messrs. Palmer & Co. in 1830, he was thrown out of employ, and offered his services to the Society.

The Society had every reason to be satisfied with the judicious nomination of the Sub-Committee, as they found in Mr. DeVerinne a combination of qualifications well adapted for their purpose.

Mr. DeVerinne in addition to a considerable degree of practical knowledge of Agriculture in Bengal, possessed steadiness

and activity with a proficiency in the Native language; and his prompt attention to the orders of the Committee, soon secured their confidence.

Akra was a perfect wilderness when the Society took possession; and, the land being overgrown in every direction with rank grass, immense labour was required to root it out, and keep it from choking every thing sown: The natives moreover manifested great disinclination at first to work on any terms: but these and other obstacles, were soon removed by the conciliatory measures adopted by Mr. DeVerinne.

Your Committee, having briefly alluded to the preliminary arrangements which were entered upon at the suggestion and with the aid of Government for the establishment of an experimental farm, will now proceed to an analytical outline of the principal objects which the Society had in view, and of the result of their labours.

First. As to the mode of cultivation adopted by the Superintendent, under the direction of the Agricultural Committee, and the general distribution of land from the beginning of operations on the 17th November, 1830, up to the end of April 1831.

It appears* that the total quantity of land rented by the Society amounted by measurement, to 456 beegahs and 6¾ cottahs; of which 282 beegahs and 7 cottahs appear to have been planted with cotton by the Superintendent.

In addition to this cultivation there was, when the Society took possession of Akra, a small plantation of cotton occupying 37 beegahs and 8 cottahs, which had been planted by Mr. Smoult, and was given up to the Society by that gentleman on payment of rent and outlay, making in all 319 beegahs and 15 cottahs.

Referring to Mr. DeVerinne's tabular statements,† the cultivation appears to have been laid out in the following order and proportions.

A. *Sea Island Cotton.*

(Planted according to the Demerara plan.)

Eighty-four beegahs and 9½ cottahs: of which 78 beegahs and 1¾ cottahs were sown with seed imported from America, and 6 beegahs and 7¾ cottahs with seed produced in Bengal. Of this cultivation 7 beegahs and 18¼ cottahs planted in November, 1830, flowered in February, 1831, ripened in April, and gave a

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* Appendix, No. I.

† Appendix, No. II.

very superior long staple; but the produce was scanty, and the plan was that pointed out by the Court of Directors.*

Again 42 beegahs and 10½ cottahs were sown at intervals during the first week of February, March, and April, 1831. This crop flowered in April, May, and June; was ripe in July; and gave a very long staple, but small returns.

Seven beegahs more were sown at the end of March, 1831, flowered in July, ripened in September, and gave a very fine staple but small produce.

Six beegahs and 7¼ cottahs were sown in the middle of June, 1831, with seed produced at the farm: did not vegetate.

Twenty beegahs and 13 cottahs were sown in November, 1831, vegetated in December, but came to nothing.

B. *New Orleans Cotton.*

(Seed received from the Court of Directors.)

Nine beegahs and eighteen cottahs sown in November, 1831, on the native broad cast plan, proved a total failure.

Fifty beegahs were sown in November and December, 1831, on the Court of Directors' plan—a total failure.

C. *Upland Georgia.*

Seventy beegahs were sown in November and December, 1831, with seed received from the Court of Directors, and on their plan: flowered in February, 1832, was ripe in April; quality good, but no returns.

D. *Bourbon.*

Fifty beegahs were sown with seed received from the Mauritius on the Isle of France plan, flowered in September, was ripe in December; quality good; returns trifling.

Ten beegahs and 6½ cottahs sown in November, 1831, on the Court of Directors' plan—a *total failure.*

E. *Different kinds.*

(Broad cast plan.)

Seven beegahs and 12½ cottahs were sown at different periods with seed received from different persons: quality fair; returns trifling.

F. *Mr. Smoult's Plantation of Seychelles Cotton.*

Thirty-seven beegahs and 8 cottahs of established cultivation

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* Of this, 1 beegah 2 cottahs were produced by transplanting; but the result was precisely the same as from the other portion reared at once from seed.

before the Society possessed Akra. The season of sowing is not ascertained, and no fixed plan observed. The seed was brought from the Mauritius; produced cotton of good quality; fair returns. These were the operations which engaged the attention of the Agricultural Committee up to the end of April, 1831.

The next statement* shews that all the foregoing lands were broken up, and a second series of experiments made as follows:

AA. *Upland Georgia.*

Various plots, making in the aggregate 71 beegahs and 9 cottahs, were sown with Upland Georgia seed received in November, 1831, from the Court of Directors, which for the most part flowered in February, 1832, was ripe in April, and the quality *very good;* returns small.

BB. *Sea Island.*

One hundred and twenty beegahs sown in November, 1831, with seed received direct from the United States—a *total failure.*

CC. *Bourbon.*

Fifty beegahs planted in November, 1831, on the Mauritius plan, with seed received from Bourbon.

These crops suffered so severely from the hail storms of 25th and 26th March, 1832, just before the pods had time to ripen, that no estimate can be made of what they might have produced.

The quality of such as was saved, was reported by the superintendent to be very good.

From the above data, your Committee draw the following results:—

NOVEMBER AND DECEMBER SOWINGS.

Sea Island Seed.

Seven beegahs and 18¼ cottahs planted in November, 1830, flowered in February, was ripe in April, produced little but good.

Twenty beegahs, 13 cottahs sown in November, 1831, had not flowered on the 30th April, 1832, and although nothing is

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* Appendix, No. III.

on record to guide your Committee, as it is only stated, it came to nothing, they are led to infer that the hail storm in March destroyed the crop.

New Orleans Seed.

Sown in November and December, 1831, on the native broad cast plan, and part on that of the Court of Directors—all *failed from bad seed.*

Upland Georgia Seed.

All vegetated (with exception of what was sown on the broad cast plan, which failed); flowered and ripened at the same periods as the Sea Island Cotton sown at the same time, and apparently of good quality, although returns were small. It has been already explained that the storm was the principal cause of *this* failure.

FEBRUARY, MARCH AND APRIL SOWINGS.

Bourbon Seed.

Bad, no crop.

Sea Island.

Sown in February, March and April; flowered in April, May, and June; ripe throughout the rains; quality bad.

JUNE SOWING.

One plot sown in June with seed produced on the farm, *did not vegetate.*

From the foregoing particulars your Committee are disposed to attribute the failure of crops at Akra to several causes.

1st. It would be unreasonable to conclude that the soil and climate of an isolated spot can be received as a criterion of the capabilities of India, nor indeed of the varieties of soil which abound in Bengal alone.

2d. It has been shown that the foreign seed vegetates, that the plant flowers and ripens; producing a staple of good quality. This fact is proved by the testimony of one of your Committee* whose experience and judgment are the best guarantee for the accuracy of our own opinion: and, if added to this, your Committee may further be guided by the actual result of a trial-shipment made to Liverpool by Messrs. Willis and Earle, at the request of the Society,† it is not going too far to

* See Appendix, No. IV. Vide Mr. Patrick's opinion.

† See Appendix, No. V.

express their confident decision in favour of the Upland Georgia Cotton, which your Committee hope, ere long, to see the *grand staple export of India.*

Your Committee now consider it their duty to point out, what appear to them to have been the principal causes of failure in the Akra crops.

It cannot have escaped the observation of such Members as have taken any interest in these proceedings, that the gale of October, 1831, and subsequent hail storms in March, 1832, although they materially interfered with the results of the experiments, (happening as they did, at the most critical periods,) were yet only secondary causes.

The principal ones lie in our positive ignorance of the proper seasons for sowing; from bad seed; and from the selection of land, rather forced upon your Society, and wholly unsuited to the growth of cotton, being *too rich* in most places, and *too salt* in others.

This fact is so palpable that it hardly requires remark. It has shown itself in every progressive step from sowing the seed, to the last stage of cropping the cotton.

1st. It has shown itself by the rapidity and luxuriance of vegetation in the production of abundance of wood, leaf, and flower, but little produce.

2d. By an almost unceasing process of blossoming, thereby exhausting the plant, before it had attained maturity, and consequently deteriorating the staple in the ratio of excessive bearing.

3d. By the general result of short produce, an invariable sign of too rich and moist a soil.

4th. To another cause your Committee are disposed to ascribe failure, viz. an improper mode of planting.

It is clear that the Native broad cast plan, at least for imported seed, will not answer; and that the same plan adopted in North America is not successful in a soil so different as that of Akra.

The seeds being sown at *equal distances* from each other, to prevent the roots from interlacing, as the removal of one plant injures another; the success of a good crop will depend upon the land being dug to a sufficient depth: if less than eighteen inches, the tap root, which is exceedingly delicate, and extending nearly that length, becomes obstructed, and the growth of the plant is checked.

Your Committee are impressed with a conviction that these are the leading causes of failure at Akra, and that the labours of the Agricultural Committee have been attended with great

advantage in establishing the fact, that the cotton of America will not flourish on a *rich* and *moist* soil, while its natural basis is for the most part, composed three-fourths of sand and one-fourth of clay. They consider however that there is every thing to hope from a free distribution of seed throughout the cotton districts, and that the *Upland Georgia* will in time displace the indigenous sorts now cultivated.*

In spite of all the discouraging circumstances, that have contributed to baffle the efforts of the Society in their endeavours to arrive at satisfactory conclusions, based on actual test; it is consolatory to observe that on one of the causes of failure, (the hail storm,) may possibly be the means of leading to the discovery of a mode of culture better adapted to foreign cotton.

Your Committee would beg your special attention to the following paragraph from Mr. De Verinne's letter to the Officiating Secretary, dated Surdah, 5th August, 1835; (see Appendix, No. XV.) viz. "The out-turn of the last season "1832-33, shows a more favourable result, as 60 maunds of "clean cotton and 180 maunds of cotton seed were gathered "at the farm from December, 1832, to May, 1833. It must "be recollected that the greater part of this cotton and seed "was produced from 90 beegahs and 9¾ cottahs of Upland "Georgia cotton cultivation, sown the previous season, the "stumps of which only were left after the severe hail storms "of the 25th and 26th March, 1832; these stumps threw out "fresh shoots during the rainy season of that year; were par-"tially pruned, and well hoed up at the conclusion of the rains, "and yielded from December to May, 12,963 lbs. of cotton, "including seed, making an average per beegah (of 120 "square feet), 144 lbs. which cotton after having been sepa-"rated from the seed, gave 40½ lbs. of clean cotton, and "103½ lbs. of seed."

The only tolerable crop in point of quantity (for the quality of the Upland Georgia cotton has been already declared excellent) has therefore been derived from the stumps of plants of the previous year, destroyed by the storm, and this simple fact involves a question of great importance; viz. *whether this description of cotton might not be more successfully cultivated as a perennial plant, under a course of treatment similar to that which Mr. Bruce describes as followed in Persia;*† *where, after the goats and sheep have been allowed to browse freely upon the plants (after crop),* the peasantry are permitted to complete *the work of spoliation by breaking off the remaining branches to the root.*

* See Appendix, No. VI.

† See Appendix, No. XIV.

The hail storm which occurred, and did so much damage to the plant in 1831-32, was the means of providing us with a tolerable crop in 1832-33, and really seems to point at the Persian *method as an example* for others to follow in India.

Under all the disadvantages pointed out, it is highly satisfactory to observe the profit likely to be derived from introducing the "*Upland Georgia*" on an extensive scale. If the calculation made by the Superintendent* is framed from correct data, (and certainly the result of the trial-shipment since then made to Liverpool by Messrs. Willis and Earle† fully supports it, as far as quality and value are concerned), your Committee are persuaded that success must attend the labours of the Society eventually, when the proper season of sowing and other important details shall be fully understood.

This statement of Mr. De Verinne's, when it may go before the public, has such a tendency to lead to speculation that your Committee deem it proper to bring to notice, what has occurred to them at all questionable in the general estimate.

Mr. De Verinne has very properly taken for his guidance the average rate of land rent in the Mofussil, viz. one Rupee per beegah; but it does appear that he has allowed too much for seed returns.

The cost of imported seed cannot with any safety be taken as a criterion for what may be obtained in this country. Mr. De Verinne has, it is true, made a great allowance; for he calculates the probable sale of seed, cleaned from the cotton, at $2\frac{1}{2}d.$ per lb. whereas the *prime cost* of that purchased by the Society was $4\frac{1}{2}d.$ per lb.

$2\frac{1}{2}d.$ per lb. would give about Sa. Rs. 8 10 annas per bazar maund, a price which could never be expected on a large scale of cultivation. But even assuming one-fourth of this sum as the more probable return, say Sa. Rs. 2 2 annas per bazar maund $103\frac{1}{2}$ lb. at this rate would yield 5*s.* 4*d.* which added to 23*s.* $7\frac{1}{2}d.$ the proceeds of $40\frac{1}{2}$ lb. of clean cotton at 7*d.* per lb. would give 28*s.* $11\frac{1}{2}d.$ per beegah; instead of 44*s.* $10\frac{1}{2}d.$ as stated by Mr. De Verinne. Therefore returns per beegah would be ..... 28*s.* $11\frac{1}{2}d.$

Deduct charges in Mr. De Verinne's account, 20 0

Profit per beegah ..... 8 $11\frac{1}{2}$, or about 30 per cent.

The result although far below the rate of profit assumed by the Superintendent, is nevertheless satisfactory, being based

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* See Appendix, No. VII.

† See Appendix, No. V.

upon more moderate expectations from seed returns:* while, on the other hand, your Committee are of opinion, that the average quantity of cotton which may be expected, will exceed what has been actually reaped at Akra when a better mode of culture shall have been introduced, and soil chosen better adapted to the perfecting of this most useful product; for to the richness, saltness and great moisture of the soil they have been led to attribute the shortness of returns compared with what ought to have been produced from so great a display of blossom.

Your Committee arrive at this conclusion from similar disappointment having been frequently experienced, both in the West Indies and the United States of America, before the cultivation of cotton was understood.

It has been observed that most of the seed first sown at Akra failed, and it has been shown that this failure proceeded from a variety of causes, the principal of which were the badness of the seed, a want of knowledge as to the proper season for sowing, an improper mode of planting, the land not having been dug to a sufficient depth, and planting on land which had been recently opened. But while your Committee have considered it their duty to point out these circumstances, they are bound also to state, as their deliberate opinion, that the Upland Georgia plant is that best adapted to this country, and that too much attention cannot be paid to secure and distribute, by every possible means, from time to time, a quantity of this description, until it shall have taken root in every part of India.

Your Committee can only arrive at a rough estimate of the quantity of cotton produced at the Society's experimental farm† from the statement of deliveries made by the Superintendent; and will now proceed to wind up their remarks on this article by referring to the statements which throw any light upon the subject of their enquiry.

The first of these communications, is a letter from Messrs. Willis and Earle addressed to the Society's Officiating Secretary, Mr. Bell, under date 7th July, 1835,‡ rendering an account§ of the cotton entrusted to them for the purpose of being packed and shipped for sale: and to this document your Com-

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* Even Sa. Rs. 2 2 annas is a price which could not be realized on a large scale.

† The Superintendent supplies the deficiency as follows: Returns of 1832-33—60 maunds of clean cotton, and 180 maunds of seed.

‡ See Appendix, No. V. § See Appendix, No. VIII.

mittee would beg to draw particular attention, as it contains a copy of invoice of that portion of the Society's cotton shipped, as well as account sale shewing that the quality of "*Upland Georgia*" grown at Akra, realized in Liverpool (when no particular activity prevailed) from $6\frac{5}{8}d.$ to $7\frac{1}{2}d.$ per lb. averaging about 7*d.* per lb. which price corresponds with that assumed by Mr. De Verinne in his estimate,* and further Messrs. Willis and Earle state that the date of their advice being in *March*, 1834, cotton has greatly risen since then in England, and assume the value of *such* cotton *now* (July, 1835,) at 9*d.* per lb.

Messrs. Willis and Earle go on to state that one half of the cotton sent to them by the Society is yet in their godowns, ready marked, and packed for shipment.†

This is what was reserved for the special purpose of being despatched to the Court of Directors.

The next interesting notice, which your Committee would draw attention to, is that from Mr. Patrick, of Fort Gloucester, to whom a quantity of Upland Georgia and Sea Island cotton produced at Akra, was sent for report and experiment in September, 1833.

Owing to some mishap, the result was not ascertained; but Mr. Patrick bears testimony to the quality of the Upland Georgia as being fully equal, if not superior, to the best cotton of the same description grown in America; and this opinion is advanced on a comparison of the samples with an importation to his own consignment from America of what was termed the *very best Upland Georgia*, which, according to Mr. Patrick's judgment, was neither so fine in staple nor so good in general quality.

The Sea Island cotton sent to Mr. Patrick, is stated by that gentleman to have been in *all respects very inferior*.

Mr. Patrick fully corroborates what your Committee have already stated as to the prospective success of the *Upland Georgia cotton;* and your Committee would beg special reference to the following letter from Mr. Patrick to Mr. Officiating Secretary Bell, under date 21st September, 1835, which bears out in the most satisfactory manner what he had before stated, as well as the general deductions drawn from this Report.

"Accompanying are 24 bundles (five pounds each), of "twist spun from the cotton yarn at Akra Farm under the "superintendence of the Agricultural and Horticultural So-

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* See Appendix, No. VII.

† See Appendix, No. IX.

" ciety: also one piece of cloth (10 yards) made from the " twist spun and wove by the power loom; and one piece " (20 yards) made by the Native hand loom.

" The package containing the power loom cloth is marked " by an A, and that containing the cloth woven in the Na- " tive hand loom is marked B. This cotton I have carefully " watched through the various stages of cleaning, carding, " roving, spinning, &c. and have no hesitation in characteris- " ing it as equal to the *very best Upland Georgia cotton:* its " staple is fully as long, and I would say stronger and better " adapted for mule spinning than any I have imported di- " rect from America. The Society are already in possession of " all details concerning the management and expense atten- " dant upon the cultivation of this cotton, and the probable " rate at which it could be produced even were the cultivation " introduced on an extensive scale in India; and I need not " therefore point out the vast advantages, public and private, " which might be derived from this source, were its culture " more generally attended to. My own opinion with regard " to the cultivation of Upland Georgia cotton in India, judg- " ing from what I have seen of it when tried under great " disadvantages, is, that, if judiciously prosecuted, it would " ultimately be crowned with the fullest success.

" I have sent the cloth in an unbleached state, in fact just " as it came from the loom, so that it will be seen under con- " siderable disadvantage in point of appearance."

If any further cheering evidence be necessary, your Committee would beg to draw your attention to a letter from Major Colvin, dated Kurnaul, the 16th November, 1832.*

Unfortunately Major Colvin is not particular in describing the kind of cotton received from the Society;† but what vegetated was so very superior in point of staple to any thing seen before in that part of India, where cotton abounds, that the Natives were most desirous to cultivate it; and the only question was, *where they could get it.*

Before taking leave of this important subject your Committee consider it of some moment to advert to the general interest which seems to have been created through the labours of the Society, in their endeavours to extend the cultivation of a better description of cotton in India.

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* See Appendix No. VI.

† Mr. DeVerinne supplies this omission by stating that Major Colvin received a quantity of Upland Georgia cotton seed from the Akra farm, including a small quantity of *Sea Island and Bourbon.*

The names of one hundred and twenty applicants are registered in the books of the Society, to whom cotton seed was supplied; but it is with great regret that your Committee can afford little or no information on the results obtained.*

In the absence of any reasons for the neglect on the part of receivers to furnish the Society with statements of the success or failure of their experiments, your Committee are disposed to attribute the general silence to disappointments which most of them must have met with, in common with the Agricultural Committee, from *bad seed*, or from a want of regularity on the part of the Society to publish their proceedings: as few men like to sit down in this climate to write elaborate reports on agricultural experiments, which they know will only receive, at most, a casual perusal, and be consigned to oblivion; your Committee are therefore anxious to impress upon the Society the urgent necessity of immediately resuming a *regular course of publication*, which will do more towards keeping up an interest in all, than can well be imagined.

TOBACCO.

Five beegahs and 19¾ cottahs of land were appropriated to the cultivation of tobacco at Akra;† of which a portion was planted between the 12th and 25th December, 1830; another portion between the 27th December, 1830, and the 1st January, 1831; and a third, between the 5th and 8th January, 1831.

This cultivation yielded a return of plants in number as follows:—

Persian Tobacco, ...	2,586 plants.
Virginia, ...	464 ditto.
Maryland, ...	473 ditto.

Part of this ground was laid out according to the plan recommended by the Court of Directors, and part according to the Native method, which the Superintendent thinks was attended with more success than the former, although he qualifies his remark by stating that the tobacco was sown at a bad season.

A second sowing appears to have taken place on the 2d September, 1831, and the transplanting process in November;‡ and nine beegahs were allotted for these latter experiments.

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* Some papers have since been discovered among the Records of the Society, and are now in progress of arrangement for publication.

† See Appendix, No. I.

‡ See Appendix, No. X.

The plants had attained maturity in January, 1832, and the cutting concluded on the 24th March.

Between planting and cutting, every possible attention appears to have been paid to keep the beds free from weeds; to top, and otherwise preserve the plants from decay, and the ravages of insects.

The curing process was conducted during the months of February, March, and part of April; and the returns were,

1877 plants of Persian tobacco.
1746 ditto of Maryland.
604 ditto of Virginia, from seed produced at *Akra*, and
41 ditto Maryland.
136 ditto Longpear tree, from seed supplied by Mr. Willis.

Three different modes of drying and curing the leaf were adopted, as will be seen on referring to the same statement; but nothing is on record to show the result of these trials.

A subsequent statement* shows another trial of five beegahs which yielded returns of

Good leaf B. Mds. 19 17 0
Broken and inferior 11 10 0

Total baz. mds. 30 27 0, or say 6 mds. 5 seers per beegah.

The charges of cultivating and curing this tobacco (5 beegahs) amounted to Sa. Rs. 84 7 6, or *including land rent*,† to Sicca Rupees 20 6 2 per beegah.

Mr. De Verinne estimates the average price of country tobacco at 4 Rs. per maund; but states that Akra produce has been valued by competent judges at 50 per cent. more.

To be within the bounds of moderation, your Committee will reduce the enhanced value to 25 per cent. or say 5 Rs. per maund. At this rate baz. mds. 6 5 0, the reputed produce of one beegah, would give Sa. Rs. 31. From this deduct for cultivating, curing and packing 5 beegahs, Sicca

Rupees 84 7 6 or per beegah	16	6	3
Land rent at 2 Rs. instead of 3 Rs. 8 As.	2	0	0
	18	6	3

Profit per beegah Sa. Rs. 12 9 9, or about 39 per cent. Even this appears to your Committee an enormous profit; nevertheless with the statements before them, they are bound to draw their inferences accordingly.

It may be used as an argument against these statements,

* See Appendix, No. XI.

† The land rent is here calculated at 3 rupees 8 annas per beegah.

that the average rate of profit on most articles of raw produce, now in India, is so low as hardly to pay the cultivators.

This may be true, and yet Mr. De Verinne's statements be correct; for the usurious interest charged upon loans to the peasantry is alone frequently as high as 30 per cent. and the various hands through which it has to pass, (each deriving a profit upon the transaction,) shews that it must originally have cost very little, and that in the case of capital being applied by one individual to a certain article, the difference between prime cost, and what it brings in the market, would be the amount of profit now absorbed in interest, and the various channels through which it passes.

There cannot, your Committee think, be a doubt about the possibility of improving the quality of this article so as to render it an export of vast importance. While now, from the inferiority of the indigenous sorts, the consumption is for the most part confined to the country, and for good tobacco we are dependent on other places.

It has not been clearly shewn, what particular sort is best suited for the climate and soil of Bengal.

SUGAR CANE.

On a cultivation of four beegahs at Akra, the charges amounted to Sa. Rs. 84 7 9, including land rent calculated at 3 Rupees 8 annas per beegah; or average cultivation per beegah, Sicca Rupees 21 1 11. From this the returns were;

Of Mauritius cane,	2,449 in No.
Yellow Otaheite,	2,358 ditto.
Red Bombay,	124 ditto.
White ditto,	100 ditto.
Red Country,	75 ditto.
Total	5,106 canes.

The Superintendent adds* that, of the Mauritius and yellow Otaheite canes, ten in number of middling size weighed 92 lbs. averaging more than 9 lbs. each, while the common white desee cane weighed only 1 lb.

Of these large canes, 4,106 appear to have been distributed to applicants in Calcutta, and throughout the interior.

As no experiments were made upon the properties of these canes produced from imported stock, your Committee are un-

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* See Appendix, No. XII.

able to speak to the comparative advantage that would attend their general introduction; and the hereditary distaste of the Natives to any thing new, might prevent them from immediately cultivating the superior cane now within reach; but your Committee are satisfied that any such prejudice will soon give way to the force of European example.

It is to be lamented that no results have been obtained from individuals, who have had supplies of seedling plants from the Society; but it is owing, probably, to the same cause, as the absence of reports upon cotton, viz. the neglect of the Society to publish their proceedings.

Your Committee are however impressed with a conviction of the utility of encouraging by all possible means, the growth of a superior description of cane.

ARROW ROOT.

From the papers laid before your Committee, four beegahs appear to have been planted with arrow root between the 2d and 10th of March, 1831, from bulbs received from the Society's Horticultural garden at Alipore.

This was said to be the West India arrow root; and under that impression, (with special reference to the abundant returns yielded at Akra), it has been since cultivated to a considerable extent.

Dr. Wallich, on his return to Calcutta in 1833, stated however, that the arrow root plant brought from the Cape of Good Hope by the late Mr. Leycester, and the "*Maranta ramosissima*," introduced into the Botanic garden at this place from Sylhet about twelve years ago, are the same species, and that both differ from the West India "Maranta arrundanacia."

The Superintendent states, that this crop was most luxuriant: the produce was chiefly distributed to applicants, and a portion manufactured, the remainder being kept for re-planting.

A statement is given by Mr. DeVerinne,* showing the returns from this same small plot, (the second crop), the *actual* cultivation being confined to three beegahs and five cottahs: another plot measuring one beegah and four cottahs is included in this estimate.

It is unnecessary to recapitulate details here; Mr. DeVerinn in allusion to these experiments, states, that this arrow root has been sold this season, (1832-33,) by Tulloh & Co. for 12 annas

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* See Appendix, No. XIII.

the pound, which, at the rate of 60 Rupees per maund, gives 2,550 Rupees.

Deduct the charges on the above Sa. Rs. 121 3 0, and an overplus is left of Rs. 2,307 10 0; a monstrous profit, but this of course could not be expected on a large quantity.

It has been since cultivated largely by individuals, who have experienced considerable difficulty in obtaining remunerating prices in Europe.

It may be expected from your Committee that they should touch upon the cause of abandoning the experimental farm at Akra.

Active operations commenced on the 14th October, 1830, and were vigorously prosecuted until June, 1833. A few months previous to the expiration of the lease of the farm held by the Society, and on some suggestions being offered at this time by the Superintendent regarding future operations, it was considered proper to discuss the utility of continuing experiments by a renewal of the lease.

The object which the Society, (with the substantial aid afforded by Government), had in view, had been accomplished; and the maintenance of an expensive establishment, it was thought, would be no longer necessary.

The Society therefore came to the resolution of discontinuing operations.

The results are given in this report as fully as circumstances and documentary evidence will permit. The Committee in laying their report before the Society beg to express their deep regret at the unfortunate fate of the premium fund. The amount at credit of the Society in the books of the Treasurers, on the 11th December, 1832, was Sa. Rs. 21,842 4 2: which was all involved in the lamented failure of Messrs. Alexander and Co. Their regret is the more because, in their opinion, the agricultural interests of India must have suffered from the disappointment occasioned to many candidates by this event, which prevented the Society from carrying into effect the liberal intentions and encouragement held out to enterprise by the Government.

Your Committee would be neglecting the most pleasing part of their duty, were they to close their report without bearing unqualified testimony to the ardour and public spirited zeal with which the experiments at Akra were carried on by those gentlemen, to whom the care of general Superintendence

was committed, and of whom Sir Edward Ryan was President.

With the increasing interest, which has been infused into every branch of the Society, and by the addition of new members, they are sanguine respecting the benefits that will eventually result from the labours of those, whose time and suggestions are devoted to the spread of improvement, in a field sufficiently ample in extent for the exercise of our best energies and combined skill.

(A True Copy,)

JOHN BELL,

Officiating Secretary.

September, 1835.

To G. A. BUSHBY, Esq.

Secretary to Government, General Department.

Sir,

I have the honour, by direction of the Agricultural and Horticultural Society of India, to forward for the information of the Governor General in Council, a copy of their report upon certain experiments recently carried on at Akra, in the articles of Cotton, Tobacco, and Sugar Cane.

2d. I am further instructed to forward a duplicate of this report, with a request, that you will be pleased to transmit it to the Honourable the Court of Directors, so as to reach England at the same time as seven sample bales of Akra grown Cotton, to which allusion has already been made in a letter from Messrs. Willis and Earle to my address, which forms part of the Appendix.

3d. In addition to this Cotton, the Society have now under immediate shipment, to the Honourable Court, a sample bale of yarn, and two parcels containing each a piece of cloth made under the immediate superintendence of Mr. W. Patrick at the extensive works of Fort Gloucester, from one of eight bales of Cotton originally intended to be shipped.

These specimens, the Society hope will enable the Court of Directors to form an opinion on the result of their labours; and whether the benefits likely to be hereafter derived from these trials, will not amply repay the expenditure so liberally allowed by the Government.

4th. It is important to bear in mind, that the seven bales of Cotton now under dispatch, and the *eighth* from which the twist and cloth have been made, are identical in every respect with those sent to Liverpool by Messrs. Willis and Earle, which readily sold on an average all round at seven pence per lb. in March, 1834, when the value of Cotton in the English market was stationary.

5th. The weight which the Society attach to Mr. Patrick's matured opinion, renders his paper exceedingly valuable, concurring as he does in the general tenor of the Society's Report, and especially on the prospective advantages which may now be confidently anticipated by following up, and giving every facility to the introduction of Upland Georgia Cotton in particular, as also to the other descriptions of Cotton the growth of North and South America.

6th. The Society desire me to express their great regret at the delay which has occurred in making up their Report since the Akra farm has been abandoned; but many circumstances have combined to put it out of their power to furnish it at an earlier period.

I have the honour to be,

SIR,

Your most obd. humble servant,

(Signed) JOHN BELL, *Offg. Sec.*

CALCUTTA,
September 26, 1835.

APPENDIX.

No. I.

A Statement of the progress of operations since my taking charge of the farm on the 17th November last, up to the end of April, 1831.

	Beeg.	*Cott.*	
No. 1. on my plan.	6	16¼	By measurement were sown with Sea Island cotton seed, (known in commerce by the appellation of black seed,) the last week in November, the land having been first dug to the depth of one foot with kodalies, and then ploughed and harrowed till completely pulverized, and freed from all grass and weeds, then laid out according to the Honourable the Court of Directors' plan, No. 1, published in the Bengal Hurkaru of 5th July, 1830. It commenced vegetating the second week in December. The plants are now two, three and four feet in height,* covered with large yellow blossoms and bolls in proportion, appearance very healthy and thus far promise well—would have been in my opinion still better, had the soil been a little less impregnated with salt, and if the seed had been sown about a month earlier. This seed was received direct from America, and given to the Society by Mr. John Palmer. In the above measurement, 1 beegah and 11 cottahs in different parts, have no plants, owing to the seed not having vegetated.†
Nos. 2, 3, 4, 5 & 6. on my plan.	16	6¼	By measurement the land prepared as above, but at present unoccupied, and to remain so for the present season, owing to its being too much impregnated with salt.
Nos. 7, 8 & 9. on my plan.	5	19¾	By measurement good soil, the land prepared as above were planted with Virginia,

* The difference in size, I think, attributable to the greater or less quantity of salt in the different parts of the soil.

† For the same reason as above.

	Beeg.	Cott.	
			Maryland, and Persian tobacco plants, received from Sir R. Colquhoun, Bart. from the Horticultural garden, and from Mr. Hodgkinson of Garden Reach, produced from seed furnished to him by the Secretary of the Society.
			The plants were received by me on the 6th December, placed on a bed here for a week, and then transplanted. Some according to the Honourable Court of Directors' plan, No. 2, and others according to the Native method, which on the whole succeeded better than the former, and I think more suitable to the climate. Some of the leaves of the Virginia tobacco plants planted *on* the Native method, on No. 8, of my plan, measured 3 feet in length by 14 inches in breadth: even what has been cured now measures 2 feet 10 inches in length by 13 inches in breadth, an allowance of course *to* be made for its shrinking.
			2586 Persian, 464 Virginia, 473 Maryland, } Tobacco plants have been cut, and the whole is now being cured according to the Honourable Court of Directors' plan, No. 2.
			Even the experiment has not had a fair trial as it was attempted too late in the season, immediately after the rains, being the time taken advantage of by the Natives for this particular vegetation.
No. 9.	3	0	By measurement. Is a rich dark and loving soil, the land prepared as above, has been reserved for sugar cane, part of which is planted on the West Indian, and the Native methods, with the following varieties of sugar cane.
			Yellow Otaheite species. Received from Mr. Calder.
			Ditto Bourbon ditto. Received from the Botanical garden.
			Ditto ditto ditto. Received from Messrs. Willis and Earle.
			Red Bombay ditto, White country ditto, Red ditto ditto, } Procured in the neighbourhood.
			Of the two methods, I should certainly

	Beeg.	*Cott.*	
			give the preference to the former, the plants looking more healthy and vigorous, and the details accomplished with greater facility, the native method requiring too much useless care, and attention during its first stage.
No. 10. on my plan.	1	2	By measurement; good soil, the land prepared as above, and laid out according to the Honourable Court of Directors' plan, No. 1. with *transplanted Sea Island cotton plants* taken from a bed sown with Mr. Palmer's seed, on the 21st November last, the plants all look healthy but are backward in size, which I attribute to the transplanting at an unfavourable season of the year, the only chance of its succeeding well under that operation being during the rains.
Nos. 12, 13, 14, 15, 16 & 17. on my plan.	42	10½	By measurement, the best part of a good soil; land prepared as above, have all been joined in one and form the present Demerara plantation, which is laid out according to Mr. J. Broker's detailed instructions in Gill's Technicological Magazine; has been sown with sea Island cotton seed given to the Society by Mr. Palmer and Mr. Henley, during the first weeks of February, March, and April. The plants are looking well, and some of those sown in February, are in blossom similar to what was sown in November No. 1. of my plan, there being a difference of two months in the respective sowings, which I think in a measure tends to the belief, that this is the proper season (which it ought to be at least in this country) for its yielding its crop, and in that case should certainly be sown as soon after the rains as practicable, in preference to any other time of the year.
No. 18. on my plan.	8	6½	By measurement; has reeds for making mats upon it, which are now being removed by the proprietor.
No. 19. on my plan.	22	13	By measurement; was sown with paddy last season; has been ploughed several times, and at present remains unoccupied.
No. 20. on my plan.	19	2	By measurement; sundry ryuts have been allowed to retain possession, as tenants paying rent to the Society.

	Beeg.	Cott.	
No. 21. on my plan.	51	17	By measurement. Mr. Smoult's Bourbon cotton plantation, 37 beegahs 8 cottahs of which have plants, and the remainder 14 beegahs 9 cottahs at present uncultivated; two small baskets of fresh cotton are gathered daily from this plantation.
No. 22. on my plan.	27	9	By measurement; remains uncultivated, and has been reserved for pasturage for the buffaloes.
No. 23. on my plan.	132	3½	By measurement; fine rich soil, the land cultivated as above, only required seed, and orders for being laid out.
No. 24. on my plan.	54	5¼	By measurement; good soil, and prepared as above.
No. 25. on my plan.	4	0	By measurement; the land prepared as above, and has been planted with West India arrow root, on the plan adopted at the Horticultural garden; the bulbs received from thence were put into the ground between the 2d and 10th March, all vegetated by the end of the month, and the plants are now from 1½ to 2 feet in height, and growing very luxuriantly.
No. 26. on my plan.	2	7	By measurement; the land prepared as above; has been sown with the three following descriptions of indigo seed in the ordinary way, viz. Bengal seed, Up-Country seed, and Caraccas seed; the whole has vegetated and is doing well.
No. 27. on my plan.	7	0	By measurement; the land prepared as above and sown at different dates, commencing with the end of March with Mr. Henley's Sea Island cotton seed, according to the Honourable Court of Directors' plan, No. 3, with the exception of ridges having been substituted for drills, being better adapted for the approaching rainy season; has vegetated, and is doing as well as can be expected for the short time it has been sown.
No. 28. on my plan.	2	10	By measurement; the land prepared as above, and divided into separate squares of five cottahs each, being a continuation of broad cast sowings with the different descriptions of cotton seed in my possession, and commencing with the 15th March past up to the 30th ultimo, the interval between each sowing being a fortnight.

	Beeg.	Cott.	
	48	18¾	Absorbed in tanks, roads, sluices, and sluice drains, mango topes, and buildings.
Beegahs	456	6¾	Total amount of land belonging to the Society at Akra.

(Signed) J. M. DE VERINNE.

Akra, 11*th May*, 1831.

Abstract of the above Statement.

		Cott.	Beeg.	Beeg.	Cott.
Cotton.	Mr. Smoult's Plantation sown with Sechelles seed,	37	8		
	Demerara ditto sown with Sea Island seed in February, March and April,	42	10½		
	Plantation formed on the Honourable Court of Directors' Plan, No. 1, and sown with Sea Island seed the end of November,	6	16¼		
	Ditto ditto transplanted with Sea Island cotton plants the second week in February,	1	2		
	Ditto ditto formed according to plan, No. 3, and sown with Sea Island seed between the 27th March and 30th April,	7	0		
	Broad cast sowings in separate patches of 5 cottahs each, commencing 15th March to 30th April,	2	10		
	Total in cotton,			97	6¾
Tobacco.	Planted between the 12th and 25th December, according to the Honourable the Court of Directors' plan, No. 2,	2	3¾		
	Planted between the 27th December, and 1st January, according to the Native method,	2	12		
	Ditto ditto between the 5th and 8th January,	1	4		
	Total in Tobacco,			5	19¾

		Beeg.	Cott.	Beeg.	Cott.
Arrow Root.	Planted between the 2d and 10th March,			4	0
Sugar Cane.	Planted in January, February and March,	0	13		
	Land reserved,	2	7		
	Total,			3	0
Indigo.	Sown in the ordinary way—				
	February 26th,	1	0		
	March 26th,	0	7		
	April 8th,	1	0		
	Total in Indigo,			2	7
Lands.	That have been dry, ploughed, and harrowed, and at present unoccupied,	202	15		
	Paddy Land, has been ploughed several times,	22	13		
	In possession of ryuts,	19	2		
	With reeds,	8	$6\frac{1}{2}$		
	Uncultivated,	41	18		
	Roads, Tanks, Sluice Drains, topes and buildings,	48	$18\frac{3}{4}$		
	Total,			343	$13\frac{1}{4}$
	Grand Total, Beegahs			456	$6\frac{3}{4}$

(Signed) J. M. DE VERINNE.

11*th May*, 1831.

present period.

Number of each Plot.	*Quantity of Ditto Pods gathered.*	*Ditto Pods ripened.*	*Quality of Cotton gathered.*	*Quantity of return produce.*
	Beeg			
1	6	n Apl. 1831,	Very superior long staple,	Very trifling.
2	6	Failure,	Failure,	Failure.
3 to 6	9	Ditto,	Ditto,	Ditto.
10	1	April 1831,	Fine long staple,	Very small.
12 to 17	42	July 1831,	Very long staple,	Ditto.
18 & 19	30	Sea Island ot yet, ourbon fail- d,	Sea Island none, Bourbon failed,	Sea Island none, Bourbon failed.
21	37	No account,	Very good,	Pretty fair.
23	120	Upland Ge- gia 1832, ew Orleans iled,	Upland Georgia, very good,	None.
24	50	Dec. 1831,	Good,	Trifling.
27	7	Sept. 1832,	Very fine,	Ditto.
28	7	Different eriods,	Very fair,	Trifling.
Total	31			

ned) J. M. DE VERINNE,

Akra, April 30, 1832.

Ditto Pods ripened.	*Quality of Cotton.*	*Quantity of return produce.*	*Cut up by the hail storms of the 25th and 26th March, 1832.*	*Present appearance.*
April 1832,	Very good,	None,	Completely,	Reviving and looking very healthy.
Since failed,	Since failed,	Since failed,	Since failed,	Unoccupied.
Failed,	Failed,	Failed,	Failed,	Part unoccupied.
April 1832,	Very good,	None,	Completely,	Reviving and looking healthy.
Ditto,	Ditto,	Ditto,	Ditto,	Upland Georgia, ditto Sea Island.
"	"	"	Ditto,	½ Sea Island looking healthy, ½ Bourbon failed.
"	"	"	Ditto,	Rather poor.
Not yet,	None gathered,	Ditto,	Ditto,	The whole very promising.
Failed,	None,	Ditto,	"	Unoccupied.
April 1832,	Very good,	Ditto,	Ditto,	Reviving and looking healthy.
Ditto,	Ditto,	"	Ditto,	Ditto.

(Signed) J. M. DE VERINNE.

No. IV.

Mr. Patrick's Report.

In September, 1833, I received from the Akra farm, a quantity of Upland and Sea Island cotton, weighing in the gross (that is including the seed) about 2400 pounds of the former, and about 1800 pounds of the latter; which, at the solicitation of the Agricultural Society, I intended to have had taken from the seed, cleaned, spun, and woven into cloth, which I was alone prevented from carrying into effect, in consequence of the awful sickness with which the establishment here (in common with the surrounding country) was about that time assailed, arising from the effects of the tempest and inundation that occurred in the end of the preceding month of May, which gale not only occasioned the stoppage of the mills, but also damaged and destroyed a considerable portion of the cotton in question. During the time that this cotton has been under my charge I have often and carefully examined it, and have no hesitation in saying, that the quality of the Upland Georgia grown at Akra, is fully equal, if not superior, to the best cotton of the same description grown in America. I had an excellent opportunity of forming a judgment as to the comparative quality of this cotton, having in the month of November received a quantity of what was called the very best Upland Georgia cotton direct from the United States, which was neither so fine in staple, nor so good in general quality.

The Sea Island cotton received by me from Akra was in all respects very inferior, and whether arising from the ill adaptation of the soil of Akra, or the inferiority of the seed used, was a failure.

In looking over the statement showing the result of the cultivation of the Upland Georgia cotton at Akra, the charges appear to me to be correct, and from the quality of the article produced, and at the rate at which in common seasons it can be brought into market, I have no hesitation in saying that a splendid field is open for the employment of capital in this quarter of India in cultivating Upland Georgia cotton.

No. V.

To JOHN BELL, Esq.

Secretary to the Agrl. and Hort. Society.

Sir, *Calcutta, July 7,* 1835.

We have the pleasure and satisfaction of now sending you the account of the result of the cotton sent to Liverpool on account of the Agricultural Society.

1st. A copy of the original invoice of it fully descriptive of the kinds, and of their several periods of growth at the Akra farm, the mere charges expended being added without any commission of our own.

2d. The account of sale of the same from Messrs. D. and T.

Willis, of Liverpool, dated 31st March, 1834. At the time this cotton was shipped, it was assumed that it would bring in the English market more or less 7*d*. per. lb. and it is pleasing to find that according to the degree of its quality it has sold during the time when the value of cotton was pretty stationary in the early part of the year 1834, at from 6⅞*d* to 7½*d* per. lb. averaging about 7*d*. per. lb; and this is the assumed value in which one of Mr. De Verinne's estimates goes to shew a large profit on the cultivation of Upland Georgia cotton, if produced in lower Bengal. Since the period when this was sold cotton has generally greatly risen in England, and this cotton would now be worth there at least 9*d*. per. lb.

There is still in our godown a remaining portion, or half, of the cotton originally sent to us by the Society, screwed and got ready for redelivery, whenever the late Mr. Secretary Robison should have called for it. This was intended in order that the Society might have given it over to Government, requesting them to send it, if they did not themselves forward it to the Court of Directors. This has been wholly neglected or forgotten by him; and we did all that we were requested to do in the matter.

As the Society have now, from the result of the mission to Liverpool, full experience of the merits of the experiment before them, we would recommend the remaining half, which remains undisposed of to be sold at auction, and the proceeds carried to the credit of the Society; unless on any ground, whatever, it should still be deemed of consequence to send it to the Court of Directors. You have also herewith a list invoice of it as packed in a similar manner as that which went to Liverpool, with the mere charges expended added to it.

Here are also some other accounts of the arrow root sold by us for the Society, and of the arrow root, tobacco and cotton sold by Tulloh and Co. on account of the Society, also an account shewing from all these matters a sum in balance due from us to the Society of Sicca Rupees 174-11-3, which we shall be glad to pay on receiving your receipt for the same.

You are aware that we hold besides (1,000) one thousand Rupees of the Society for a special purpose, the provision of cotton seed which may come from America. Yours, &c.

(Signed) WILLIS AND EARLE.

No. VI.

To the SECRETARY to the AGRICULTURAL SOCIETY,

Calcutta.

Sir, *In Camp near Kurnaul, 16th Nov.* 1832.

In explanation of the object of my present letter. I beg to bring to your recollection, that early in the present year I received a package

from the Agricultural Society, containing cotton and tobacco seed, the latter too late for sowing that season, and the former in time. It was accordingly, with the view of spreading it along the canals, divided into small portions, the whole of which were planted according to the directions published in the newspapers; but, I regret to say, the seed almost universally proved bad, and only six seeds have vegetated; from these the produce has been collecting for a month past, and there is still a quantity to collect. This will yield a small quantity of fresh seed; and the superiority of the cotton in quantity and quality over that usually grown in the country, is so very great, that the zemindars in the neighbourhood of the growing plants, are most anxious to get seed: and being now on a progress along the canals, I have with me one pod, produced from the Calcutta seed, of such magnitude, that all who see it, make only one enquiry, where they may get the seed. I may here notice, that cotton is most extensively cultivated on the line of country, between Kurnaul, Delhi, and Rhotuck; and whenever irrigation from the canals is available it is most extensively irrigated with great advantage to the quantity of the produce. The introduction of seed of superior qualities would therefore be of no small advantage to the zemindars, and an object which I should be delighted to effect for them. To show the great difference between the produce of the Calcutta seed and the common seed of the country, I enclose three pods stripped of the capsule.

No. 1. The common seed as grown generally without irrigation,
No. 2. Ditto ditto ditto on the canals, and
No. 3. The produce of the Calcutta seed.

And I can only add, that all the seed which can be spared, will find people willing to cultivate it, and spread it till it supersedes the common kind.

Another article of extensive cultivation in these districts is the sugar cane; and of that, I am led to believe, the species grown here is as inferior to the kind lately introduced at Calcutta as is the common cotton of the country here. I feel therefore anxious to introduce a better kind on the canals before I leave them. I know not how the seed may be preserved; but, if it be possible, I am willing to procure a supply of cotton and sugar cane seed, in quantity sufficient, in the first instance, to spread along a distance of 200 miles of the canals, to go to an expense of 3 or 400 Rupees, for which my brother Mr. A. Colvin will be responsible. Less than 8 or 10 mds. of cotton seed would hardly suffice; and to reach me in time, a small boat direct to Guvinkisher ghaut should be despatched, with no load save what the Society can give me in the way of seed. So that, including boat-hire, the cost do not exceed 400 Rupees, I will be content; and, addressed to the care of Mr. Hickey at Meerut, it will reach me safe. The season for planting cotton is here from 15th March to 15th April, and then from 15th May to about 10th July. Sugar cane is also planted in March and April; and I trust it will be possible to ensure these seeds coming in time.

The tobacco seed which came up last year too late for planting, has

been sown this year, and has vegetated freely; of the produce I shall therefore be able to inform the Society hereafter, and mean time will feel obliged by a communication of what the Society do in regard to my present application.

I have the honour to be,
SIR,
Your obedient servant,
(Signed) JOHN COLVIN, *Major*.

No. VII.

FIRST STATEMENT.

Shewing the returns from 90 beegahs 9¾ cottahs of Upland Georgia cotton on plots 2, 12, 26 and 29, late Nos. 1, 2, 3, 24, and 27, having been 12,963 lbs. 5 oz. 2 drs. including the seed, making the average per beegah of 120 square feet, 114 lbs.: which cotton after having been separated from the seed gave 40½ lbs. of clean cotton, and 103½ lbs. of seed.

Therefore say 40½ lbs. of clean cotton at 7*d.* the lb.
is equal to ..... 23*s.* 7½*d.*
103½ lbs. of cotton seed* at 2½ the lb. is equal to ... 21 3

Total returns per beegah, shillings 44 10½ pence.

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* The cotton seed calculated above at 2½*d.* the lb. cost the Society 4½*d.* the lb. as per account furnished of the cotton seed purchased from Messrs. Hurry and Willis, and taken from the account at the Town Hall. It may be cultivated in the Mofussil, where good land may be had in any quantity, and at a cheap rent, as follows, according to the above returns; which, however, may increase considerably in a better soil and locality.

Total charge per beegah. *Bengal currency.*				Total charge per beegah. *English currency.*		
R.	*A.*	*P.*		*s.*	*d.*	
2	0	0	or	4	0	for cultivation charges.
3	0	0	or	6	0	for gathering and cleaning by the churka.
1	0	0	or	2	0	for land rent.
2	0	0	or	4	0	for Agency and other charges in Calcutta.
2	0	0	or	4	0	for ditto ditto in England.
Sa. Rs. 10	0	0	or Shillings	20	0	total charge per beegah.

Returns per beegah brought down, Shillings 44 10½ pence.
Deduct charges 20 0

Profit per beegah, Shillings 24 10½ pence above 100 per cent.

No. VIII.

Invoice of five screwed Bales and four hand-compressed Bags of sundry kinds of Cotton Wool, packed up and shipped by the undersigned on the order, and for account and risk, of the Agricultural Society of Calcutta, per the Ship *Morgeana*, Captain George Fethers, for Liverpool, and consigned for sale and returns to Messrs. Daniel and Thomas Willis of that port.

The Calcutta Agricultural Society's Cotton Wool.

LPL } No. 1 to 5, five screwed Bales,
ASC } No. 6 to 9, four hand-compressed Bags,
} The produce of the Akra farm, 8 miles distance from Calcutta.

Nos. of packages.	*Net wt. of each on packing.*	*Net wt. each in Baz. Ms.*	*Description of Cotton.*	*Season when gathered.*	*How cleaned.*	*Willis and Earle's Remarks.*
	c. q. lbs.	*m. s. c.*				
1	0 1 9	0 22 14¼	Upland Georgia,	1831-32	Saw ginned,	We believe from imported seed sown in Nov. 1831, and gathered in the spring of 1832.
2	1 1 9	1 32 9	Ditto,	1832-33	ditto,	We believe from the same plantation which supplied bale No. 1, and its second produce.
3	1 1 9	1 32 9	Ditto,	ditto,	ditto,	Ditto.
4	1 0 20½	1 24 8¼	Ditto,	ditto,	Churkeed	Ditto.
5	1 0 20½	1 24 8¼	Ditto,	ditto,	ditto,	Ditto.
6	0 0 17	0 8 4¼	Bourbon	1831-32	Saw ginned	We believe to be from Mr. Smoult's plantation which is 3 or 4 years old.
7	0 0 5½	0 2 11	Ditto,	1832-23	Churkeed	Ditto.
8	0 1 0½	0 13 14	Sea Isld.	ditto,	ditto,	We believe from imported seed sown either in Nov. 1831, or in the spring of 1832.
9	0 0 23½	0 11 7½	Upland Georgia,	ditto,	ditto,	From acclimated seed at Akra farm being 1 year in descent from the imported seed.
	6 0 12½	8 13 5½				

CHARGES.

	R.	A.	P.
Cost of Rowannah on import from Akra farm into Calcutta,	5	3	9
Packing and screwing with double gunny rope and marking 5 bales, at 3 rupees 1 anna each,	15	5	0
Packing and compressing in double gunny, and marking 3 bags, at 2 rupees 1 anna each,	6	3	0
1 bag,	1	1	0
Cooly-hire on receiving, conveying to screw house, and to the wharf, and boating for shipment,	2	4	0
Bills of lading,	0	8	0
Godown rent, and Commission on shipment, not charged.			
Sa. Rs.	30	8	9

At the Agricultural Society Maritime risk.

Drawback recoverable on bazar maunds 8 21 8, at 5 annas per bazar maund.

(Signed) WILLIS AND EARLE.

Calcutta, 3d July, 1833.

No. IX.

Invoice of five screwed Bales and three hand-compressed Bags of sundry kinds of Cotton Wool, packed up by the undersigned, on the order of the Agricultural Committee, for the purpose of being forwarded by the said Society to the Court of Directors of the Honourable East India Company in London.

The Calcutta Agricultural Society's Cotton Wool.

LdN } No. 1 to 5, five screwed Bales,
ASC } Nos. 6, 8, 9, three hand-compressed Bags,
} The produce of the Akra farm, 8 miles distant from Calcutta.

Nos. of packages.	*Net wt. of each on packing.*	*Net wt. each in Baz. Ms.*	*Description of Cotton.*	*Season when gathered.*	*How cleaned.*	*Messrs. Willis and Earle's Remarks.*
	c. q. lbs.	*m. s. c.*				
1	0 1 19	0 22 14¼	Upland Georgia,	1831-32	Saw ginned	We believe from imported seed sown in Nov. 1831, and gathered in the spring 1832.
2	1 1 9	1 32 9	Ditto,	1832-33	ditto,	We believe from the same plantation which supplied bale No. 1, and its second year's produce.
3	1 1 9	1 32 9	Ditto,	ditto,	ditto,	Ditto.
4	1 0 20½	1 24 8½	Ditto,	ditto,	Churkeed	Ditto.
5	1 0 20½	1 24 8½	Ditto,	ditto,	ditto,	Ditto.
6	0 0 17	0 8 4½	Bourbon	1831-32	Saw ginned	We believe to be from Mr. Smoult's plantation which is 3 & 4 years old.
8	0 1 ½	0 13 14	Sea Isld.	1832-33	Churkeed	We believe from imported seed sown either in Nov. 1831, or in the spring of 1832.
9	0 0 23½	0 11 7½	Upland Georgia	ditto,	ditto,	From acclimated seed at Akra farm being 1 year in descent from the imported seed.
	6 0 7	8 10 10½				

CHARGES.

	R.	A.	P.
Cost of Rowannah on import from Akra into Calcutta,	5	3	6
Packing and screwing with double gunny rope, and marking 5 bales, at 3 rupees 1 anna each, ...	15	5	0
Packing and compressing in double gunny, and marking 3 bags, at 2 rupees 1 anna each, ...	6	3	0
Cooly-hire on receiving and conveying to screw-house and back to godown and thence to the Society's room at the Town Hall, ...	1	4	0
Godown rent and Commission, not charged.			
Sa. Rs.	27	15	6

N. B. A drawback will be recoverable on shipment of this cotton as per Calcutta Rowannah, No. 164, dated 13th April, 1833, bazar mds. 7 8 at 5 annas per bazar maund.

(Signed) WILLIS AND EARLE.

Calcutta, 3d July, 1833.

No. X.

Mode of culture adopted on the twelve beegahs of Tobacco planted at the Farm, season 1831-32.

Sowed the seed in beds of rich mould on the 2d September, which vegetated on the 7th and 8th following.

Commenced transplanting the young plants from the nursery beds on the 3d of November on plots 8, 9, and part of 23, and concluded the same on the 29th of the same month. Thoroughly hoed and weeded the same three times, between the 15th November and 29th February. Irrigated the whole at different periods between the 1st January and 31st March. Topped and took off the suckers every ten days, between the 1st December and 24th March. Commenced cutting ripe plants on the 29th January, and concluded on the 24th March: the drying and curing of which commenced on the 29th January, and finished on the 18th April. The number of plants cut were 4404 of which 1877 were Persian, 1746 Maryland, and 604 Virginia, from last year's seed produced here, and 41 Maryland, and 136 long pear tree, from seed furnished by Mr. Willis in September.

Mode of drying and curing adopted at the Farm on the above-mentioned Tobacco.

450 plants, of which 150 were Virginia, 150 Persian, and 150 Maryland, were cut on the 24th February, hung up in the godown, the

leaves on the stem, and dried entirely in the shade; which process was concluded on the 15th April: the leaves were then taken off their stems, sweated for three days, and then packed, viz. 50 Persian, 50 Maryland, and 50 Virginia.

Second Experiment

With 50 Maryland, 50 Virginia, and 50 Persian. These were cut on the 5th March, dried in the sun during the day, and left out in the dew during the night; which process was concluded on the 3d April. The leaves were then removed from the stems, sweated for three days, and then put in the sun only, for four days longer, and afterwards packed.

Third Experiment

With 50 Maryland, 50 Virginia, and 50 Persian. These were cut on the 7th March, dried only in the sun, and taken into the godown in the evening; which process was concluded on the 5th April. The leaves were then taken from the stems, sweated for three days, and then put in the sun again for four days, and afterwards packed. All the remainder of the Tobacco was cured according to No. 2, with this exception, that the leaves were taken off the stems immediately after being cut, being easier to manage, and taking up less room.

Statements of lands at present unoccupied, and which may be appropriated to crops previous to the commencement of the rainy season.

	Beeg.	*Cott.*	*Previously*
No. 2,	6	7¾	Sown with Upland Georgia cotton seed, native method, since failed.
No. 6,	5	0	Unoccupied; very salt.
Nos. 8, 9 & 23,	12	0	At present Tobacco, which will very shortly be taken up.
No. 19,	10	0	Sown with Mr. Ballard's Bourbon seed: failed.
No. 24,	25	0	Ditto with ditto ditto ditto: failed.
No. 21,	14	9	Fresh dug up and ploughed.
No. 22,	27	9	Ditto ditto; part very good for tobacco.
No. 26,	2	1	Fresh ploughed, formerly indigo.
Beegahs	102	6¾	Cottahs.

(Signed) J. M. DE VERINNE,

30*th April*, 1832.

No. XI.

THIRD STATEMENT

Of the Cost of five beegahs of Tobacco cultivation, season 1832-33.

Cultivation charges.

Equal to R. 1-8 the maund.	24	Ploughs,	1	6	6		
	45	Planting coolies,	4	14	0		
	270	Hoeing and sundry work,	29	4	0		
	20	Irrigating,	2	2	6		
	52½	Breaking suckers,	5	11	0		
	4	Bengalee toles and turmeric,	1	1	0		
						44	7	0

Manufacturing old plan.

Equal to 1 R. the maund.	74	Coolies, cutting and drying,	8	0	6		
	7	Wooden planks for sweating,	2	3	0		
	16	Hooglah mats,	0	4	0		
	24	Bamboos for tying ditto upon,	2	0	0		
	1½	seers of twine,	0	3	0		
						12	10	6

Manufacturing on Dr. Casanova's plan.

Equal to 2 Rs. the maund.	15	Coolies, cutting and drying,	1	10	6		
	42	Feeding the fire, cutting wood, &c.	4	9	0		
	21	mds. of wood and hackery hire,	3	8	0		
	5	seers of twine,	0	10	0		
						10	5	6

Packing charges.

Equal to 8 ans. the maund.	74	Men tying up into bundles,	8	0	6		
	21	Mate mallies assisting ditto,	2	7	0		
	27½	seers of hemp,	1	11	0		
	73	young boys,	4	9	0		
	½	seer of twine and cooly-hire,	0	5	0		
						17	0	6
		Total Sicca Rupees				84	7	6

Rupees 84 7 6 ÷ 5 = Sa. Rs.	16	14	2
Land rent per beegah,	3	8	0
Total average per ditto, Sa. Rs.	20	6	2

Returns.

mds.	*seers.*	
19	17	of good leaf tobacco.
11	10	of broken and inferior.
30	27	

Total mds. 30 27 or equal to Sa. Rs. 6-5-6 average per beegah, or about 3 Sa. Rs. 4 annas the maund.

Country Tobacco sells at the rate of 4 Rs. the maund, the above has been reckoned to be at the very least 50 per cent. better: the amount then would stand as follows:

30 maunds 27 seers of Tobacco, at 5 Rupees 14 annas per maund, ... Sa. Rs.	149	9	0
Deduct charges on 5 beegahs, ...	101	15	6
Profit on 5 beegahs at the above rate, ... Sa. Rs.	47	9	6

No. XII.

SECOND STATEMENT

Of the Cultivation Charges of four beegahs of Sugar Cane, season 1832-33.

235 days coolies digging squares, at 3 Rs. 4 As.	25	7	3
143 ditto ditto planting canes, ditto, ...	15	7	3
200 ditto ditto hoeing and ridging, ditto, ...	21	10	6
55½ ditto ditto stripping off dead leaves, ditto, ...	6	0	0
17 ditto buffaloe ploughs, at 3-8	1	14	9
	70	7	9
Land rent of 4 beegahs, at 3-8 per ditto, ...	14	0	0
4)	84	7	9
Average per beegah cultivation,	21	1	11

Returns.

2449	Mauritius canes.
2358	Yellow Otaheite.
124	Red Bombay.
100	White country.
75	Red country.
Total 5106	canes.

REMARKS.

Of the Mauritius and Yellow Otaheite canes, ten canes of middling

size, weighed together 92 lbs. averaging a little better than 9 lbs. each ; the average of the common dessee cane was about a pound each.

Whole canes delivered to individuals—Season 1832-33.

26th October,	Captain Cowles, ...	Yellow Otaheite, ...	25
„	Ditto, ...	Red Bombay, ...	25
8th November,	Mr. W. Storm, ...	Yellow Otaheite, ...	35
„	Ditto, ...	Mauritius, ...	35
11th December,	Captain Cowles, ...	Mauritius, ...	300
„	Ditto, ...	Yellow Otaheite, ...	300
17th December,	Mr. Micklejohn, ...	Mauritius, ...	48
21st December,	Mr. Hodgkinson, ...	Mauritius, ...	6
„	Ditto, ...	Yellow Otaheite, ...	6
26th December,	Mr. Watson, ...	Mauritius, ...	250
„	Ditto, ...	Yellow Otaheite, ...	250
2d January,	Mr. Hodgkinson, ...	Mauritius, ...	375
„	Ditto, ...	Yellow Otaheite, ...	375
„	Mr. Gibbon, ...	Mauritius, ...	250
„	Ditto, ...	Yellow Otaheite, ...	250
2d February,	Mr. T. Savi, ...	Mauritius, ...	35
„	Ditto, ...	Yellow Otaheite, ...	35
20th February,	Mr. A. Shaw, ...	Mauritius, ...	500
„	Ditto, ...	Yellow Otaheite, ...	500
22d February,	Mr. J. Bell, ...	Yellow Otaheite, ...	6
1st March,	Mr. C. H. Blake, ...	Mauritius, ...	250
„	Ditto, ...	Yellow Otaheite, ...	250
			4106

Cane Slips put up in boxes.

14th November, 10 boxes of kinds, sent to Mr. Calder.
25th November, 10 ditto of ditto, sent to Baboo Dwarkanath Tagore.
11th December, 12 ditto of ditto, sent to Major Colvin.
19th December, 10 ditto of ditto, sent to Mr. Walters.

42 boxes about 500 canes,
Resown here 800 ditto, ... 1000

Total 5106

No. XIII.

FOURTH STATEMENT

Of Arrow Root cultivation—Season 1832-33.

Plot No. 25 now No. 9, three beegahs five cottahs. The second year of sowing the same ground with the same crop.

By Cultivation Charges.

18 days buffaloe ploughs at 3 Rs. 8 as. per month, ...	2	1	0			
21 ditto coolies planting bulbs at Rs. 3-4 ditto,	2	4	6			
112½ ditto hoeing and ridging ditto ditto, ...	13	5	0			
				17	10	6

By Manufacturing Charges.

202 days coolies pounding bulbs at Rs. 3-4 per month, ...	21	14	3			
66 ditto washing and strawing ditto ditto, ...	7	2	6			
67 ditto drying and sifting, at Rs. 3-8 ditto, ...	7	12	0			
35 ditto head sirdar mally, at 6 Rs. ditto, ...	7	0	0			
33 ditto Brijobasee attending, ditto ditto, ...	6	9	6			
				50	6	3
Land rent of 3 beegahs and 5 cottahs at Rs. 3-8 per beegah,				11	6	0
Total Sa. Rs.				79	6	9

Returns.

151 mds. 20 seers of bulb.
100 mds. made into farina, 16 26 10.
51½ mds. delivered as seed—equal to about 3½ Sicca Rupees the maund, or 1 penny the lb.

Arrow Root Cultivation, season 1832-33.

Plot No. 11 now No. 18, 1 beegah 4 cottahs, the first time of planting the ground.

6 days buffaloe ploughs, at 3 Rs. 8 as. per month,	0	11	0			
12 ditto planting bulbs, at 3 Rs. 4 as. ditto, ...	1	5	0			
68 ditto hoeing and ridging, at ditto ditto, ...	7	6	0			
				9	6	0

Manufacturing Charges.

130 days coolies pounding bulbs, at Rs. 3-4 per month, ...	14	1	9			
29 ditto washing and throwing, at ditto, ...	3	2	3			
36 ditto drying and sifting at Rs. 3-8 ditto, ...	4	2	9			
20 ditto head sirdar mally, at 6 Rs. ditto, ...	4	0	0			
13 ditto, Brijobasee at ditto ditto, ...	2	9	6			
				28	0	3
Land rent of 1 beegah 4 cottahs, at 3 Rs. 8 as. per beegah,				4	6	0
Total Sa. Rs.				41	12	3

Returns.

103 maunds 20 seers of bulbs.
69 made into Farina, 11 20.
34½ delivered as seed—equal to about 2 Rupees 8 annas the maund, or about 3 farthings the lb.

	Mds.	*Srs.*	*Cks.*
Total Farina manufactured, ...	28	6	10
Ditto seed bulb delivered, ...	86	0	0

This arrow root has been sold this season by Tulloh and Co. for twelve annas the pound, which is at the rate of 60 Sicca Rupees the maund; and supposing the whole quantity of bulbs dug up from the total cultivation, viz. 4 beegahs 9 cottahs had been manufactured into Farina, the amount would have stood thus, 42½ maunds (about) at 60 Rupees the maund, give Sicca Rupees 2,550: deduct the charges on the above Sicca Rupees 121 3, there remains a profit of Sicca Rupees 2,307 10 annas.

No. XIV.

CULTIVATION OF COTTON, BY W. BRUCE, ESQ.

(Read 15th August, 1829.)

Having resided many years in Persia, and noticed the mode of culture of the cotton plant, I beg leave to submit my observations to you for the purpose of being laid before the Society, if you deem them worthy of notice.

Cotton as cultivated in Persia.

This article is much cultivated throughout Persia, from the shores of the Persian Gulf to the Caspian Sea, particularly so in the low country, below the range of mountains along the Persian Gulph; and the nearer the sea coast, the finer the article is, along this belt of land from the base of the mountains to the sea, which varies in breadth, from ten miles to about twenty-five; the plants last many years, indeed as long as twenty to thirty; during this time the ground is often ploughed up between the plants, and sown with wheat and barley. The soil is mostly sand, mixed more or less with shells, and a small portion of loamy clay. I cannot say exactly the quantity which a plant yields, but it is considerable. After the cotton is picked, sheep and goats are turned in to graze on the leaves and shoots, which no doubt tends to enrich the soil, and improve the staple; the poor women and children also resort to them for firewood, and break them down close to the ground. When the season returns, these stumps send out fine shoots, which are soon covered with leaves; flowers follow, and then the cotton as luxuriant as ever.

The cultivation of cotton in the interior of Persia, is, however, annual, the same as in most parts of India; the produce is greater, as it

is irrigated, which the other is not; but the article is much inferior both as to staple and fineness. This leads me to suppose, that the sea coast cotton is improved, not only by being grazed on, and thus manured, but also from its superfluous stalks being broken off, which preserves all the moisture to the root, which otherwise would be required to nourish the stalks, and thus leaves the root in a vigorous state to throw out fresh shoots in the proper season; while at the same time I am much inclined to think, that the sea air has a good deal to do towards making the staple finer and better. On the sea coast of the Persian Gulph, the nankeen cotton is very extensively cultivated, and manufactured into a very decent sort of nankeen.

As the cultivation of cotton in India is of the first importance, any hints which may tend towards its improvement, will, I deem, be acceptable.

No. XV.

To JOHN BELL, Esq.

Offg. Secy. to the Agrl. and Hortl. Society.

Sir, *Surdah, 5th August,* 1835.

I had yesterday the pleasure of receiving your communication, dated Town Hall, 2d instant, accompanied by a draft of a report upon the experiments at Akra, drawn up by the Committee appointed for that purpose, and requesting me to look over the same, and offer any suggestions that may occur to me as having escaped the Committee in framing their report from the data left by me, while superintendent of the farm. I therefore lose no time in doing the needful, and returning the same, as it appears of consequence, I should do so without delay. After having given the whole an attentive perusal, I find the report is so admirably drawn up, that there is little or nothing left undone; the omissions in page 7 under the heads B. and C. I have filled up, and also corrected the error, which appeared an anomaly in page 12: likewise mentioned in page 21, the description of cotton seed which was sent to Major Colvin from the farm.

The only suggestion which I beg to offer for the consideration of the Committee, and which I do with every deference to their own already given, is my opinion as to the principal causes of the failure of the cotton crops at Akra.

1st. The locality and description of soil at Akra, in many places, were decidedly bad for any kind of cotton cultivation.

2d. The commencement of operations at the farm during the first year, having taken place rather late in the season of 1830-31, six months elapsed in getting over great difficulties, and putting matters in order for trying the experiments, which were then made upon the land ready at that time for the purpose. Unfortunately the seed sent by the Honourable the Court of Directors proved bad; which was the

cause of the failure of all lands sown with the seed: and the remainder, which was sown with seed procured from other quarters, promised well for a time, till the gale of the 31st October, 1831, which came on so furiously and was felt so severely at the farm, that the remaining plantations of that season were destroyed by it, which accounts for there having been no returns of cotton that season.

3d. The operations of season 1831-32, may be summed up as follows: a resowing of all the above lands took place with fresh seed, which vegetated fairly, and progressed satisfactorily, till the whole was completely cut up by the hail storms of unusual severity on the 25th and 26th March, 1832. This was again the cause of no returns of cotton from the crops of that season.

4th. The out-turn of the last season 1832-33, shows a more favourable result, as 60 maunds of clean cotton and 180 maunds of cotton seed were gathered at the farm from December, 1832, to May, 1833. It must be recollected that the greater part of this cotton and seed was produced from 90 beegahs and $9\frac{3}{4}$ cottahs of Upland Georgia cotton cultivation, sown the previous season, the stumps of which only were left after the severe hail storms of the 25th and 26th March, 1832; these stumps threw out fresh shoots during the rainy season of that year; were partially pruned, and well hoed up at the conclusion of the rains, and yielded from December to May, 12,963 lbs. of cotton, including seed, making an average per beegah (of 120 square feet), 144 lbs. which cotton after having been separated from the seed, gave $40\frac{1}{2}$ lbs. of clean cotton, and $103\frac{1}{2}$ lbs. of seed. This cannot therefore be called a failure, but on the contrary a very fair average return from a large quantity of land, and not less in quantity (I hear from the enquiries I have made here) than what the ryuts obtain from the indigenous cotton grown in the vicinity of Chupra and Gazeepore. Therefore the conclusion which the Committee have come to in their report, of the whole of the Akra cotton crops, having turned out failures, as far as regards returns, will prove not to have been the case after a perusal of the above. May I therefore kindly request an alteration accordingly in the fresh draft of the report, which the Society intend furnishing the Government, provided the late visiting members of the Akra Sub-Committee, including the President, (by whom the foregoing circumstances cannot be forgotten) approve of the same; to whose indefatigable vigilance, supervision, advice, and constant visitations must be ascribed the zeal with which the operations were carried on at the farm, and which it is satisfactory to find have not proved altogether unsuccessful.

I remain,

SIR,

Your most obedient servant,

(Signed) J. M. DE VERINNE,

Assistant Com. Resident.

Surdah Commercial Residency,
5th August, 1835.

(True Copy.)

J. BELL.

ADDENDUM.

To JOHN BELL, Esq.

Secretary to the Agricultural and Horticultural Society, Calcutta.

Dear Sir, *Calcutta, Oct. 17th,* 1835.

Herewith you will receive the triplicate Bill of Lading of the seven bales of cotton L D N 1 to 4 A S C and 6, 8, 9 shipped by us as requested of you per *Bussorah Merchant ;* the same being deliverable "to order," may as well have your endorsement in favour of Mr. Peter Auber, or any other functionary of the India House, who may seem to you more fit to receive it. The same bill includes your bale of twist marked Twist A &. H Soc. and your box of cloth marked Cloth A &. H Soc. and the freight made payable on delivery, is at the present rate of £5 10*s.* per 50 feet cube.

You possess all your own particulars of Invoice in regard to the bale of twist and box of cloth ; but we now give you a full and particular Invoice in duplicate of the 7 bales of raw cotton wool, which we had screwed and packed originally for the Committee of the Society, and held awaiting the call upon us for them by the then Secretary Mr. C. K. Robison.

We have noted off in the Invoice the bale No. 5 transferred to Mr. Patrick at the Fort Gloucester works, as per recent order of the Committee in July last ; and that bale is accounted for, we presume, in the bale of twist and box of cloth under the Bill of Lading of the present shipment.

The sum of Sa. Rs. 27-15-6, which is appended to the Invoice of the cotton for duty charged on import from Akra, screwing, packing, and cooly-hire has been already paid to us by you.

There will be another small bill of a couple of Rupees or so attending the shipment, which shall be sent to you in a day or two for discharge.

Be so good as to acknowledge the receipt of these matters ; and all will be in order.

Your obedient servants,

(Signed) WILLIS AND EARLE.

To PETER AUBER, Esq.

Secretary to the Honourable Court of Directors of the East India Company.

Sir,

I am directed by the Agricultural and Horticultural Society of India to advise the shipment per *Bussorah Merchant*, now on the eve of leaving this port, of seven sample bales of cotton, one bale of cotton twist, and one small box containing two pieces of cloth, consigned to you, on behalf of the Honourable Court of Directors, for which I beg leave to enclose Bill of Lading and Invoice.

It is unnecessary here to enter into any further particulars than are given in these documents, as the report of the Society upon their experiments at Akra, (a copy of which will no doubt reach you about the same time, having been sent to the Supreme Government for the express purpose,) is now in the press, and will be in England probably as soon as the original.

I am further requested by the Society to express their regret at the delay which has occurred, in the transmission of these samples; which ought to have been forwarded upwards of two years ago, but the absence of the president (Sir Edward Ryan,) who was obliged to go to the Cape of Good Hope in search of health, and the change of Secretaries, together with the failure of the Agency Houses, all combined to distract the attention of the Society from its original design.

This circumstance, however, appears likely to be attended with no inconvenience since it has afforded the Society an opportunity to lay before the Honourable Court, the result of a trial shipment, made to Liverpool through Messrs. Willis and Earle of this city; which will be found particularized in the Appendix to the Report: and this shipment being composed of duplicate samples of those now sent per *Bussorah Merchant*, will serve as data with which to compare the outturn of the other half, now consigned to you, for the inspection and information of the Honourable Court of Directors.

I have the honour to be,

Sir,

Your most obedient servant,

(Signed) JOHN BELL,

Offg. Sec. Agl. and Hor. Soc. of India.

Calcutta, 19*th Oct.* 1835.

No. 1232.

To JOHN BELL, Esq.

Offg. Sec. to the Agriculturul and Horticultural Society, Calcutta.

Sir,

I am directed by the Honourable the Governor of Bengal to acknowledge the receipt of your letter dated the 26th ultimo, with two copies of a Report of the Society, on the experiments recently carried on at the Akra farm, on certain staple products of the country, and in reply to request that you will inform the Society, that the duplicate of the Report in question will be forwarded to the Honourable Court of Directors, with a separate despatch of this day's date by the *True Briton*.

I am,

Sir,

Your most obedient servant,

(Signed) J. P. GRANT,

Dep. Sec. to the Govt. of Bengal.

Fort William,
The 6th October, 1835.

152510

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